WP-5231 Series User Manual

(WEC7 Based WinPAC)

Version 1.0.1, July 2014

Service and usage information for

WP-5231/WP-5231M-3GWA

Written by Sean

Edited by Anna Huang

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1. Introduction

This chapter provides an overview of the WP-5231 series modules and its components, and introduces the fundamental concepts for user familiar with the WP-5231 series modules.

The WP-5231 series is equipped an AM3352 CPU (720 MHz) and running a Windows Embedded Compact 7.0 operating system. Instead of external wireless module, the WP-5231 can add an internal 3G wireless module provides high-protection I/O. Using the built-in micro SD, the WP-5231 series can save application program, image file and data., various connectivity (VGA, USB, Ethernet, RS-232/485) and I/O expansion bus.

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1.1. Features

The WP-5231 series modules offer the most comprehensive configuration and remote system upgrade solutions to meet specific application requirements. The following list shows the hardware and software features designed to simplify installation, configuration and application.

➢ **Windows Embedded Compact 7.0**

● Support PC based software: Visual Studio.NET
● Web server, FTP server, Telnet server

➢ **Local I/O and Communication Expansion Board**

WP-5231 series equip an I/O expansion bus to support one optional expansion board, called XV-board. It can be used to implement various I/O functions such as DI, DO, A/D, D/A, Timer/Counter

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➢ Various Memory Expansions

WP-5231 series modules provides various memory storage options, such as EEPROM and microSD. Customers can choose the memory based on their characteristics.

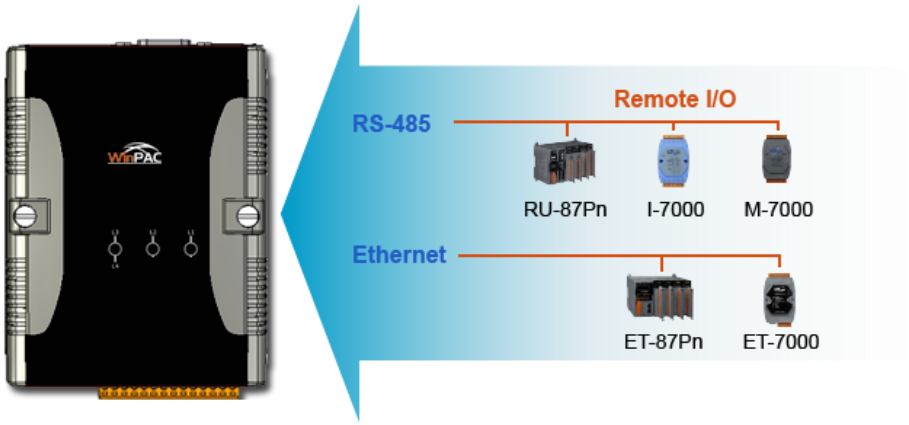
- 16 KB EEPROM: to store not frequently changed parameters.
- microSD/microSDHC: to implement portable data logging applications.

➢ Unique 64-bit Hardware Serial Number to Protect Your Program

A unique 64-bit serial number is assigned to each hardware device to protect your software against piracy.

➢ Remote I/O Module and Expansion Unit

With the built-in RS-485 and Ethernet port, the WP-5231 series modules can connect RS-485/Ethernet remote I/O units (RU-87Pn/ET-87Pn) or modules (I-7000/M-7000/ET-7000).



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➢ **Plastic and Metal Housing**

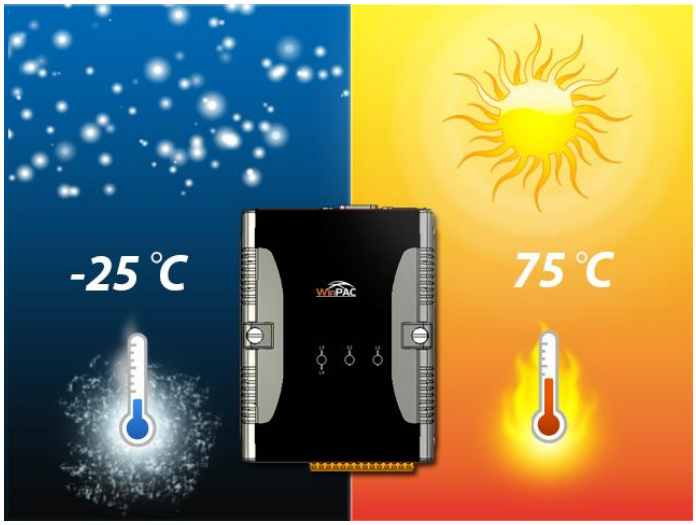
The default case is plastic material. Metal casing is also offered to provide extra security.

➢ **Small and Easy Installation**

The WP-5231 series modules have a slender shape (91 mm x 123 mm x 52 mm) to be installing in a narrow space with DIN-Rail.

➢ **Highly Reliable Under Harsh Environment**

Our WinPACs operate in a wide range of temperature and humidity.



- Operating Temperature: -25 ~ +75 °C
- Storage Temperature: -40 ~ +80 °C
- Humidity: 10% ~ 90% RH, non-condensing

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1.2. Specifications

The table below summarizes the specifications of the WP-5231 series modules.

Models	WP-5231	WP-5231M-3GWA
System Software		
OS	Microsoft Windows Embedded Compact 7.0 core	
Framework Support	.Net Compact Framework 3.5	
Embedded Service	FTP Server, Web Server , Embedded SQL Server	
SDK Provided	Dll for Visual Studio.Net 2008	
CPU Module		
CPU	TI AM3352 (32-bit and 720 MHz)	
SDRAM	DDR3 256 MB	
Flash	256 MB (70 MB for OS, 186 MB for System_Disk and System Registry)	
EEPROM	16 KB, Data Retention: 40 years, 1,000,000 erase/write cycles	
RTC (Real Time Clock)	Provide second, minute, hour, date, day of week, month, year	
64-bit Hardware Serial Number	Yes, for software copy protection	
Dual Watchdog Timers	Yes (0.8 second)	
Rotary Switch	Yes (0 ~ 9)	
LED Indicator	3, (Run/PWR, L1, L2; L1 and L2 are user programmable)	
VGA & Communication Ports		
Ethernet	RJ-45 x 1, 10/100/1000 Base-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)	
USB 2.0	1	
COM1	RS-232 (RxD, TxD, and GND); Non-isolated	
COM 2	RS-232 (RxD, TxD, and GND); Non-isolated	
COM 3	RS-485 (Data+, Data-); Non-isolated	

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COM 4	RS-485 (Data+, Data-); Non-isolated	
Wireless Port		
Wireless Port	-	3G (WCDMA)
I/O Expansion		
I/O Expansion Bus	Yes (for only XV-board only)	
Mechanical		
Dimensions (W x H x D)	91 mm x 123 mm x 52 mm	
Installation	DIN-Rail mounting	
Environmental		
Operating Temperature	-25 °C ~ +75 °C	
Storage Temperature	-30 °C ~ + 80 °C	
Ambient Relative Humidity	10 % ~ 90 % RH (non-condensing)	
Power		
Input Range	+10 VDC ~ +30 VDC	
Redundant Power Inputs	Yes	
Isolation	1 kV	
Consumption	4.8W (0.2 A @ 24 VDC)	

3G (WCDMA) Specifications	
3G (WCDMA)	
Band	UMTS: 2100/1900/850 MHz
Data Transfer	UMTS/HSDPA/HSUPA Upload: Max. 5.76 Mbps Download: Max. 7.2 Mbps
CPU Module	
Band	850/900/1800/1900 MHz
GPRS Multi-slot	Class 10/8
GPRS Mobile Station	Class B
GPRS Class 10	Max. 85.6 kbps
CSD	Up to 14.4 kbps
Compliant to GSM phase 2/2+	Class 4 (2 W @ 850/900 MHz); Class 1(1W @

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	1800/1900 MHz)
Coding Schemes	CS 1, CS 2, CS 3, CS 4
SMS	Text and PDU mode

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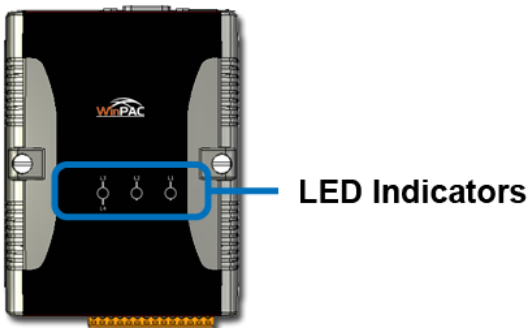
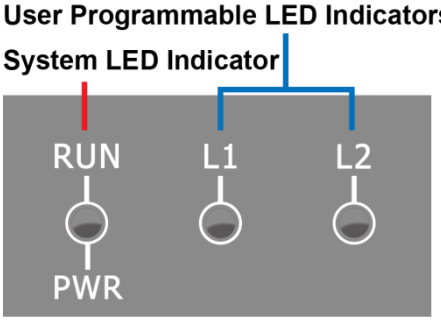
1.3. Overview

The WP-5231 Series modules are equipped with several interfaces and peripherals that can be integrated with external systems. Here is an overview of the components and its descriptions. The details of these items are as follows:

Front View



<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>LED Indicators</td><td>
The WP-5231 series modules has one system LED indicators and two user programmable LED Indicators.


A system LED indicator display the status of the WP-5231 series modules. The details are shown as below.
<table>
<tr><th>LED Indicator</th><th>Color (On state)</th><th>Meaning</th></tr>
<tr><td rowspan="2">RUN/PWR</td><td>Green</td><td>Power is on</td></tr>
<tr><td>Orange</td><td>Power on and OS is running</td></tr>
</table>
</td></tr>
</table>

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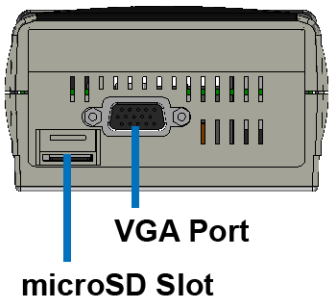
Top View



Item	Description
microSD Slot	The microSD slot is an interface that is used to access and download information on a micro card to a WinPAC.
VGA port	A VGA connector is a 3-row 15-pin connector that can be used with a variety of supported VGA resolutions, and ranged from 640 x 480, 800 x 600.

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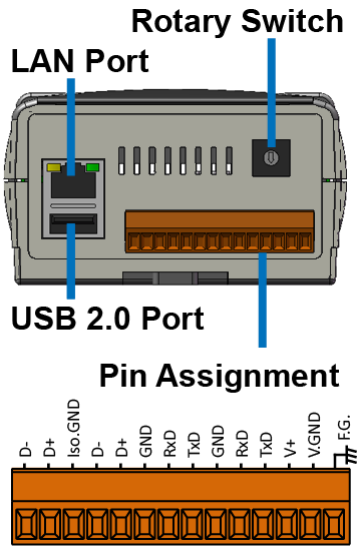
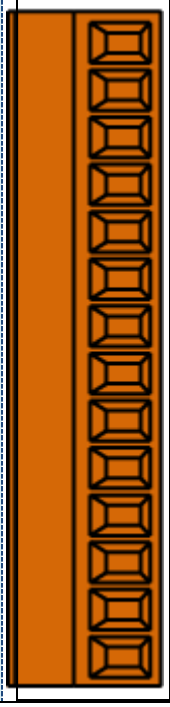
Bottom View



Item	Description
Rotary Switch	Rotary Switch is an operating mode selector switch which provides seven functions related to the selection of the operating mode for WinPAC.
LAN Port	The WP-5231 has an Ethernet port that can be connected to a computer or device via an Ethernet cable.
USB 2.0 Port	The WinPAC has an USB ports that allow support for the USB devices such as mouse, keyboard or an external USB hard drive.

Item	Description
Pin Assignment	The pin assignments of the connector are as follows:



Pin	Signal	Description
1	F.G	Frame Ground
2	V.GND	Power Input
3	V+	
4	TXD	COM1: RS232
5	RXD	
6	GND	
7	TXD	COM2: RS232
8	RXD	
9	GND	
10	D+	COM3: RS485
11	D-	
12	ISO.GND	
13	D+	COM4: RS485
14	D-	

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COM1 (3-Pins RS-232)
Note: 16C750 compatible **Baud Rate**: 15200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 bps **Data Bits**: 5, 6, 7, 8 **Parity**: None, Even, Odd, Mark (Always 1), Space (Always 0) **Stop Bits**: 1, 2 **FIFO:** 64 bytes
COM2 (3-Pins RS-232)
Note: 16C750 compatible **Baud Rate**: 15200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 bps **Data Bits**: 5, 6, 7, 8 **Parity**: None, Even, Odd, Mark (Always 1), Space (Always 0) **Stop Bits**: 1, 2 **FIFO:** 64 bytes
COM3 (2-Pins RS-485)
Note: 16C750 compatible **Baud Rate**: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 bps **Data Bits**: 5, 6, 7, 8 **Parity**: None, Even, Odd, Mark (Always 1), Space (Always 0) **Stop Bits**: 1, 2 **FIFO:** 64 bytes
COM4 (2-Pins RS-485)
Note: 16C750 compatible **Baud Rate**: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 bps **Data Bits**: 5, 6, 7, 8 **Parity**: None, Even, Odd, Mark (Always 1), Space (Always 0) **Stop Bits**: 1, 2 **FIFO:** 64 bytes

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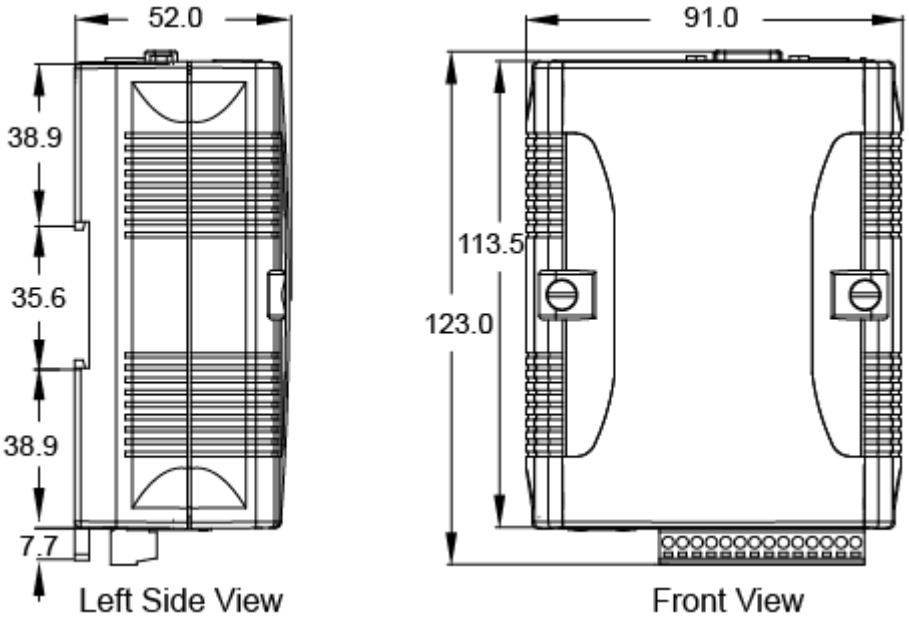
1.4. Dimensions



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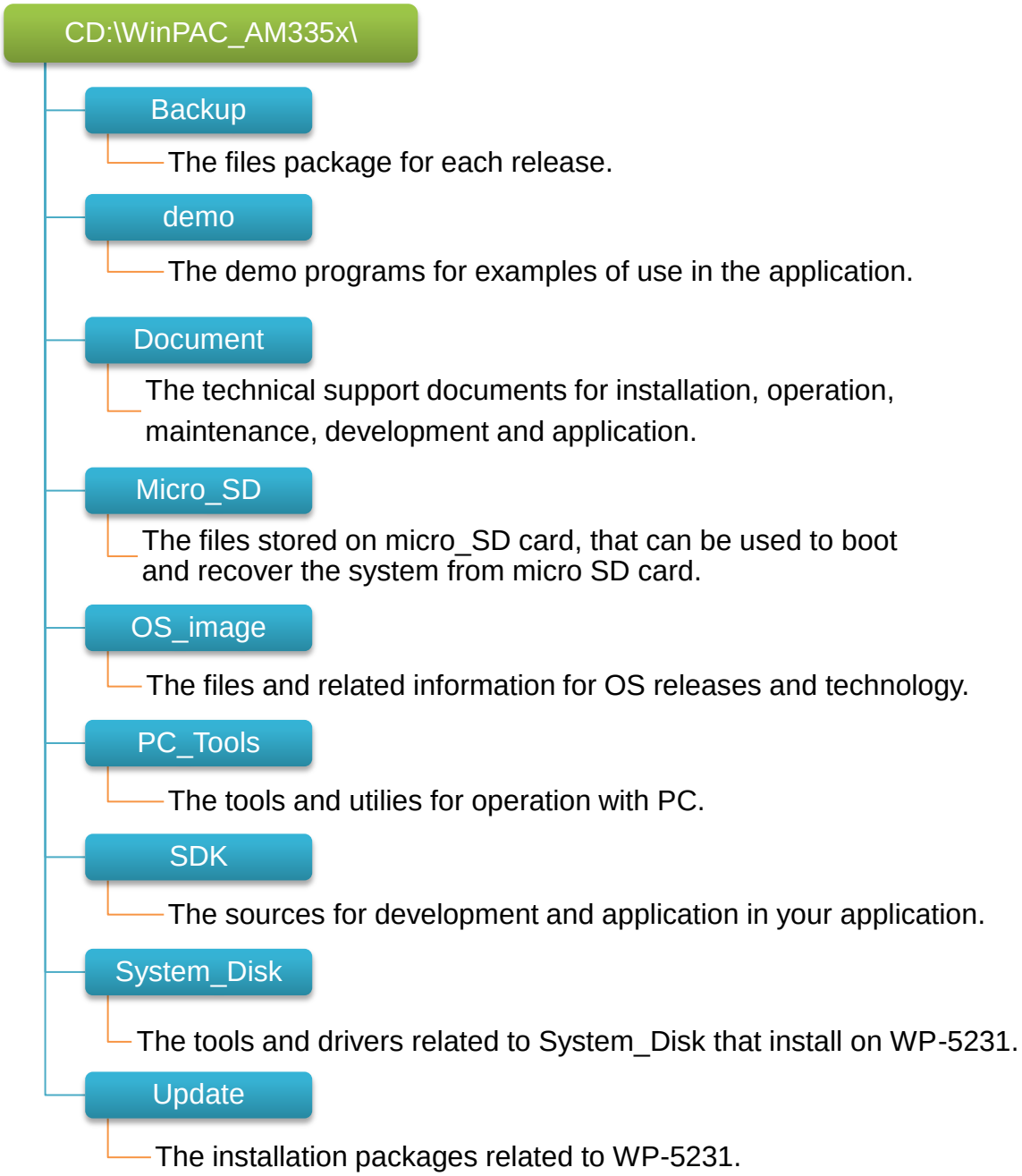
1.5. Companion CD

This package comes with a CD that provides a collection of the software utility, documentation, drivers, demo program and application. The CD contains several subdirectories located in \WinPAC_AM335x\Wp-5231\ directory. All of them are listed below.



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2. Getting Started

This chapter provides a guided tour of the WinPAC installation and configuration that describes the steps needed to download, install, configure, and run the basic procedures for user working with the WinPAC for the first time.

Before starting any task, please check the package contents. If any of the following package contents are missing or damaged, contact your dealer, distributor.

WP-5231

A microSD card and a micro SD/SD adapter

Software Utility CD

Screw Driver
(1C016)
2.4 mm

GSM/GPRS Antenna (ANT-421-02)
(for WP-5231M-3GWA series only)

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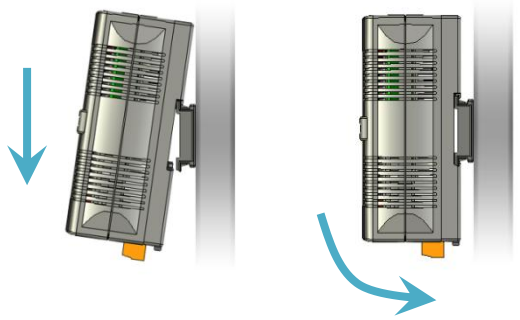
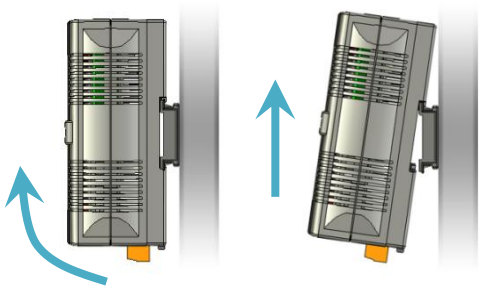
2.1. Mounting the Hardware

Step 1: Mounting WP-5231

Mounting on DIN rail	Removing from DIN rail
	

➢ **DIN rail mounting**

The WP-5231 has simple rail clips for mounting reliably on a standard 35 mm DIN rail.

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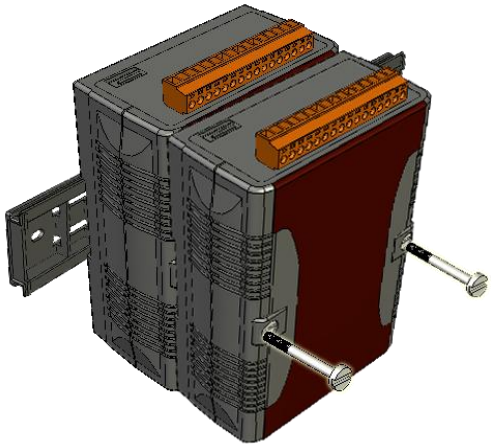
- **Piggyback mounting**

The WP-5231 has two holes on both sides for piggyback mounting.



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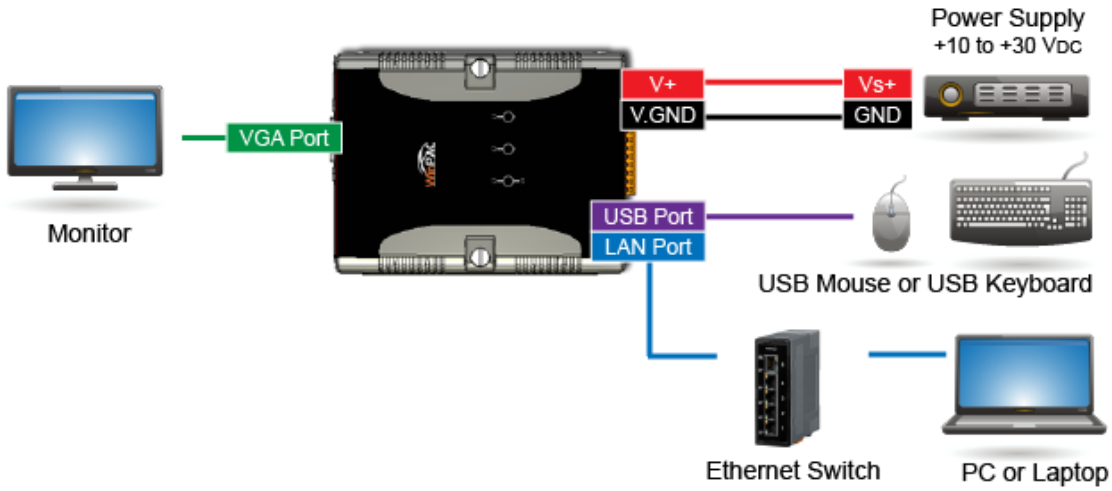
Step 2: Connecting to a PC, the USB device, and the power supply

i. Connect the mouse or keyboard to the USB port.
ii. Connect PC to the Ethernet port through a Ethernet switch.
iii. Connect the power supply (10 ~ 30 VDC) to PWR and GND terminals.
iv. Connect the monitor to the VGA port.



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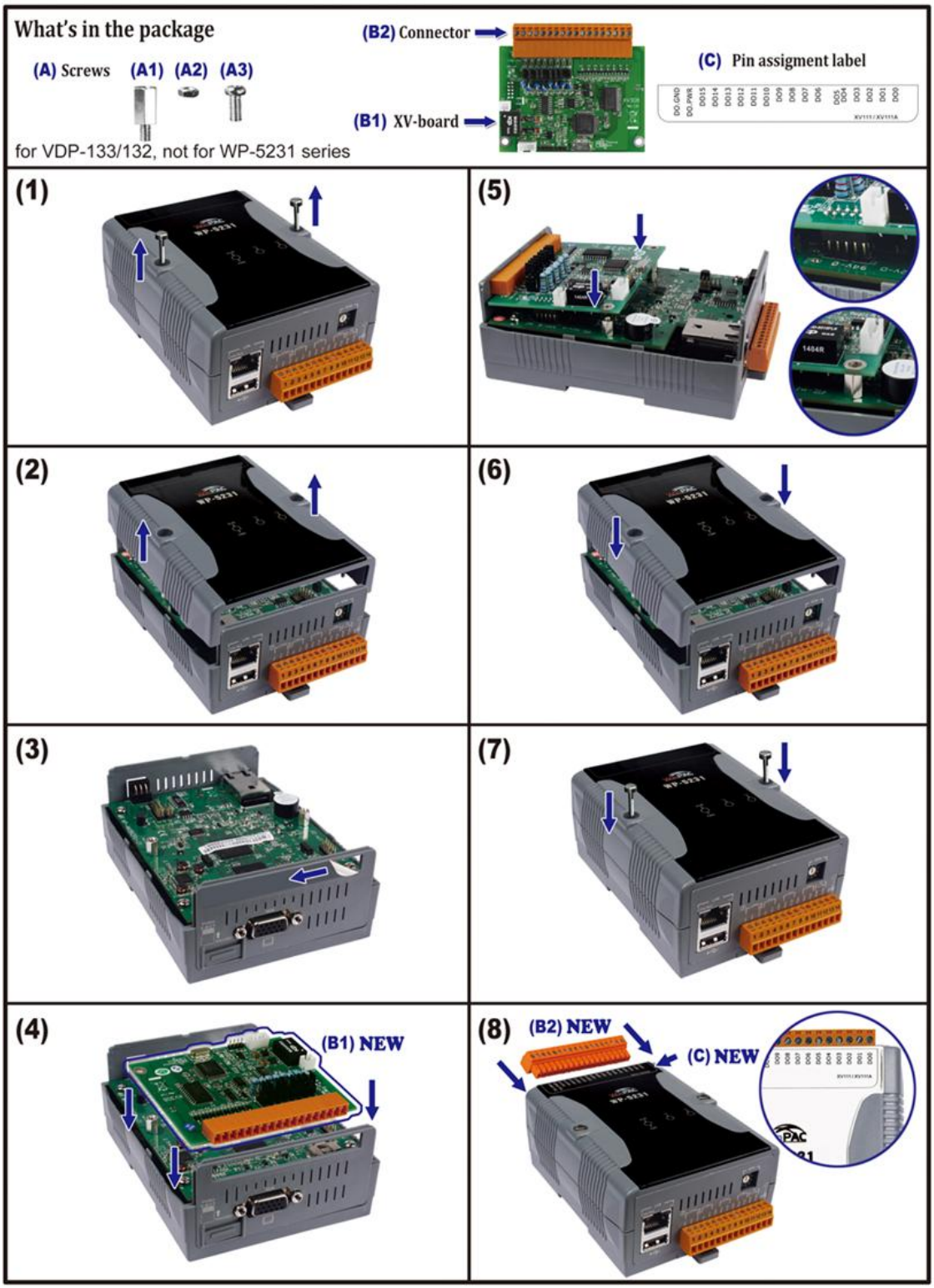
2.2. Installing the XV-Board



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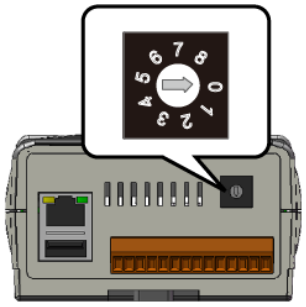
2.3. Configuring the Boot Mode

The WP-5231 has several operating modes, which can be selected by a rotary switch.



The table below lists the operation modes available with the WP-5231.

Position	Operating Mode
0	Normal mode (Default)
1	Safe mode
2	Debug mode
3	OS update mode by Ethernet
4	Reserve
5	OS update mode by Micro_SD
6	Reserve
7 ~ 9	Normal mode (For user)

The following is a brief introduction of these modes.

Normal Mode (Default mode)

Normal mode is the default mode of operation and the one you will use most of the time. Use this mode for more tasks and configurations. Programs also are executed in this mode.

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Safe Mode

Safe mode is a trouble shooting. The mode loads the minimum required device drivers and system services to boot the WP-5231.

If you have malicious software or a program caused the WP-5231 cannot be boot or run the normal mode, you can boot in safe mode to solve the problem.

Debug Mode

Debug mode is a special environment in which program debug functions can be used in addition to normal system functions.

Debug mode is unsupported.

OS Update Mode

OS update mode is a way used to update OS. For more information on updating the WP-5231 OS image, please refer to section 6.1. OS updates

Reserve->OS Development Mode

The positions 4, 6, of rotary switch are reserved for OS development.

User Mode

The positions 7, 8, 9 of rotary switch are reserved for user's applications.

When WP-5231 is boot with one of these positions, it is boot at normal mode. User's application can check the rotary switch position to run at different mode.

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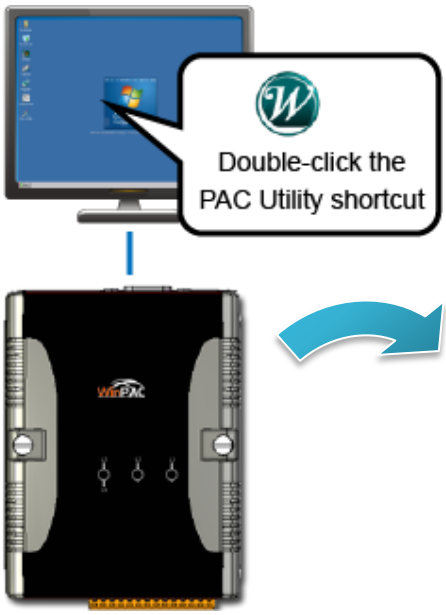
2.4. Using PAC Utility to Manage WinPAC

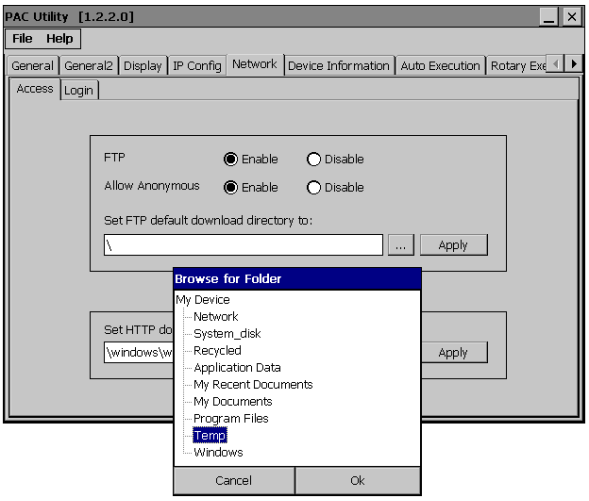
The PAC Utility is a collection of the WinPAC system tool that allows user quickly and easily manage and configure the WinPAC.

For more detailed information on PAC Utility applications, please refer to “3.1.2. PAC Utility”

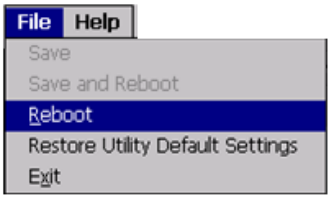
Step 1: Double-click the PAC Utility on the desktop



Step 2: Configure IP address (DHCP), FTP Server, Auto Execution files…, etc



Step 3: Reboot the WinPAC



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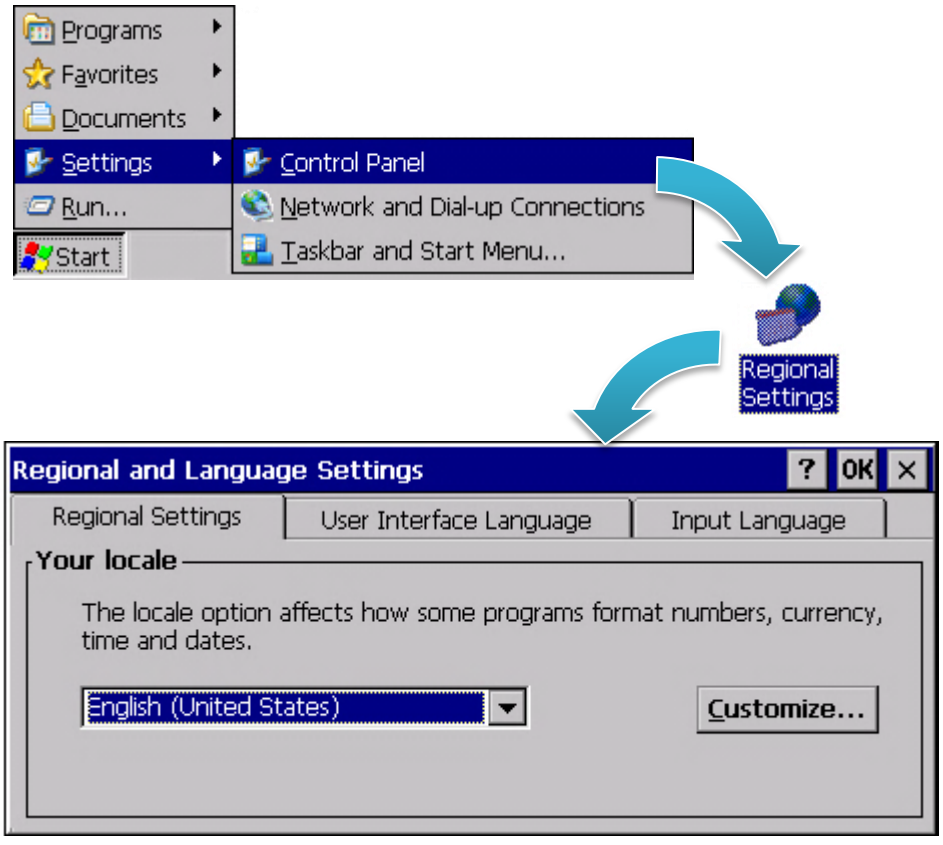
2.5. Changing the User Interface Language

The Windows CE operating system on the WinPAC comes with several built-in functions.

Step 1: Click Start menu, point to Settings, click Control Panel, and then click Regional Settings Options



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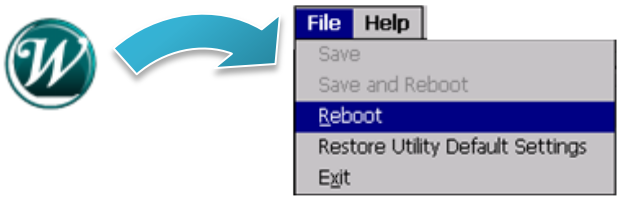
Step 2: Click User Interface Language tab, choose to your local language, and then click OK

Step 3: Run the PAC Utility, and then reboot the WinPAC for changes to take effect



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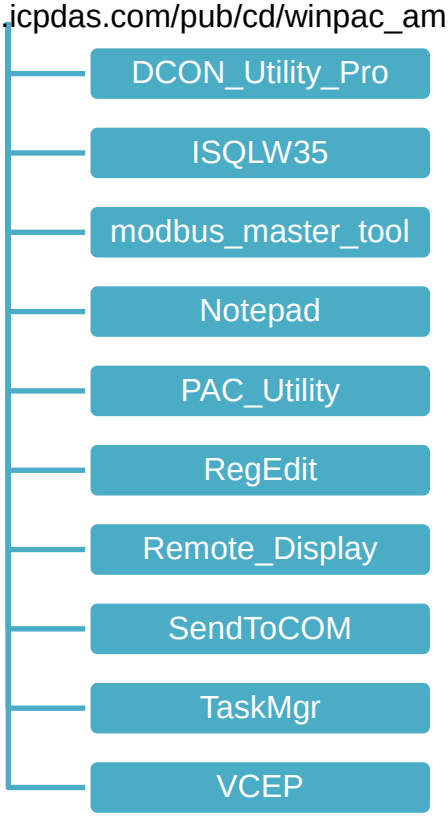
3. Tools and Tasks

This chapter provides a brief introduction of the WP-5231 service tools and its benefits.

There are several tools and utilities built-in and designed for use with WP-5231. Some of these are pre-installed on WP-5231 and can work directly on WP-5231, and some of these are supporting tools and can help you to manage the WP-5231 remotely on a PC.

The following tools are pre-installed on WP-5231 and can work directly on WP-5231 that can be found on the CD that was provided with the package or by downloading the latest version from ICP DAS web site.

CD:\WinPAC_AM335x\Wp-5231\System_Disk\Tools\
ftp://ftp.icpdas.com/pub/cd/winpac_am335x/wp-5231/system_disk/tools/



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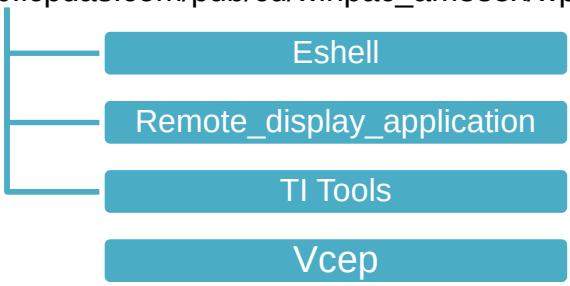
The following tools are supporting tools for remote managing the WP-5231 used on PC that can be found on the CD that was provided with the package or by downloading the latest version from ICP DAS web site.

CD:\WinPAC_AM335x\Wp-5231\PC_Tools\
ftp://ftp.icpdas.com/pub/cd/winpac_am335x/wp-5231/pc_tools/



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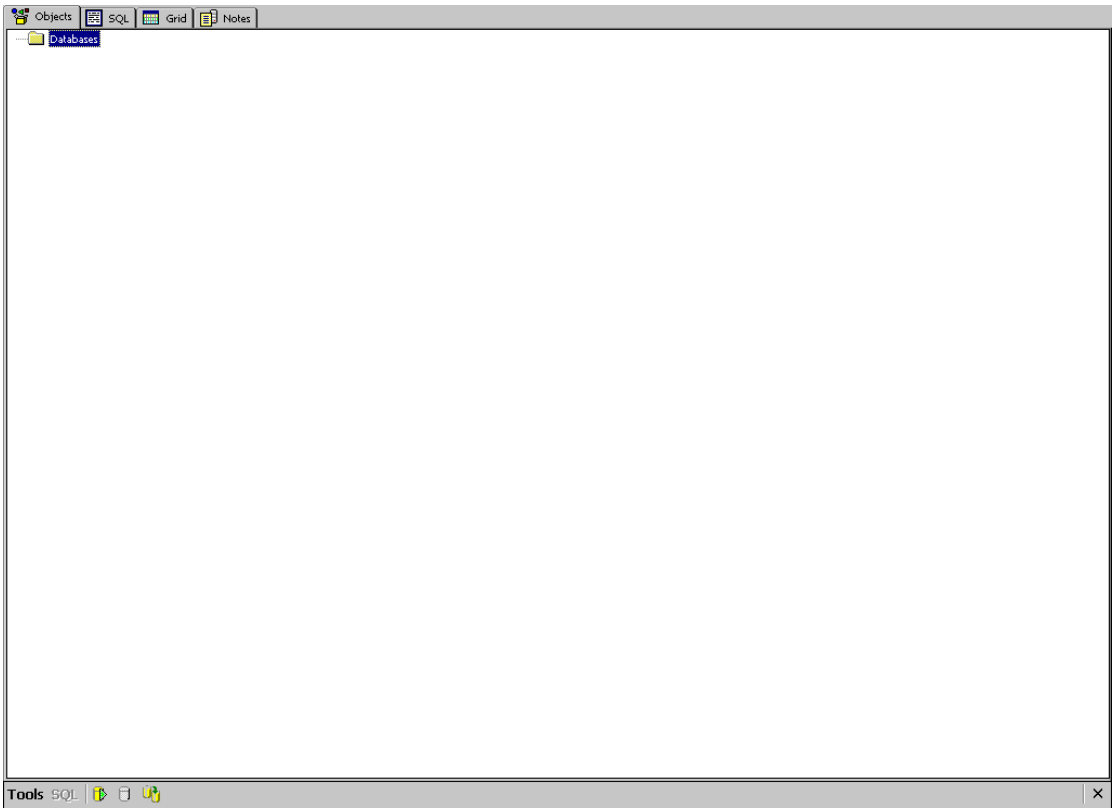
3.1. ISQLW35

The "ISQLW35" is a Windows Embedded Compact 7 functionality that implements SQL Server Compact 3.5 Query.



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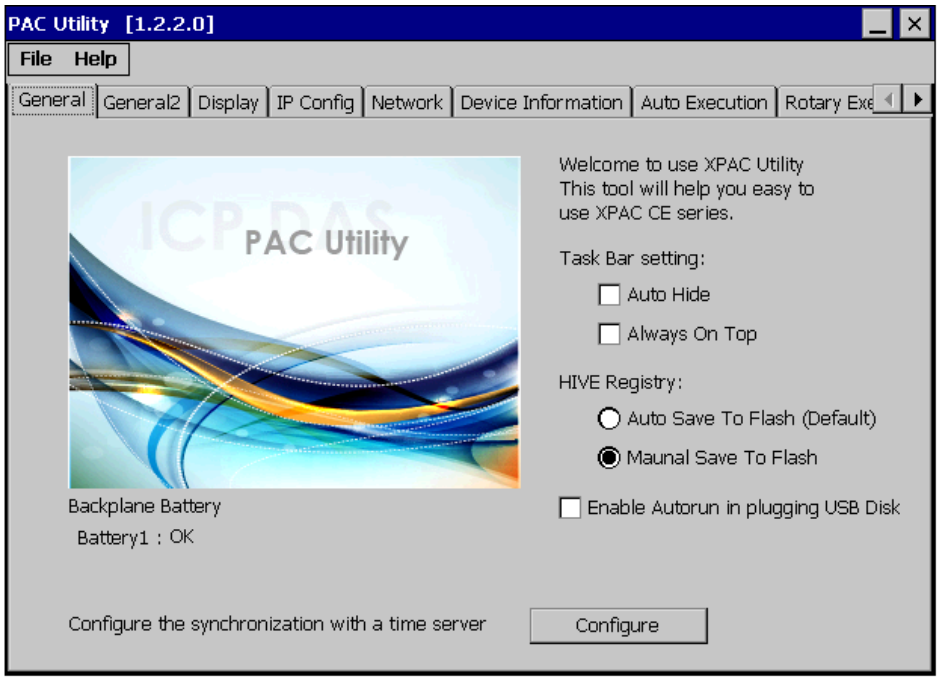
3.2. PAC Utility

PAC Utility is a collection of software applications that enable management and configuration of WinPAC system and features.



The PAC Utility includes the following menu bars and property tabs. All of these functions will be explained later.

Menu bar	Property Tab
➢ File ➢ Help	➢ General ➢ General2 ➢ Display ➢ IP Config ➢ Network ➢ Device Information ➢ Auto Execution ➢ Rotary Execution

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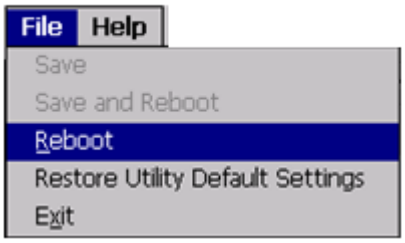
3.2.1. Menu Bar – File



The menus use to	How to use
Reboot	Restarts the WinPAC
Restore Default Settings	Restore the settings of WinPAC to its default.
Exit	Exits the PAC Utility.

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3.2.2. Menu Bar – Help

The menus use to	How to use
About	Displays a dialog box with information about PAC Utility, including the current version and copyright information.

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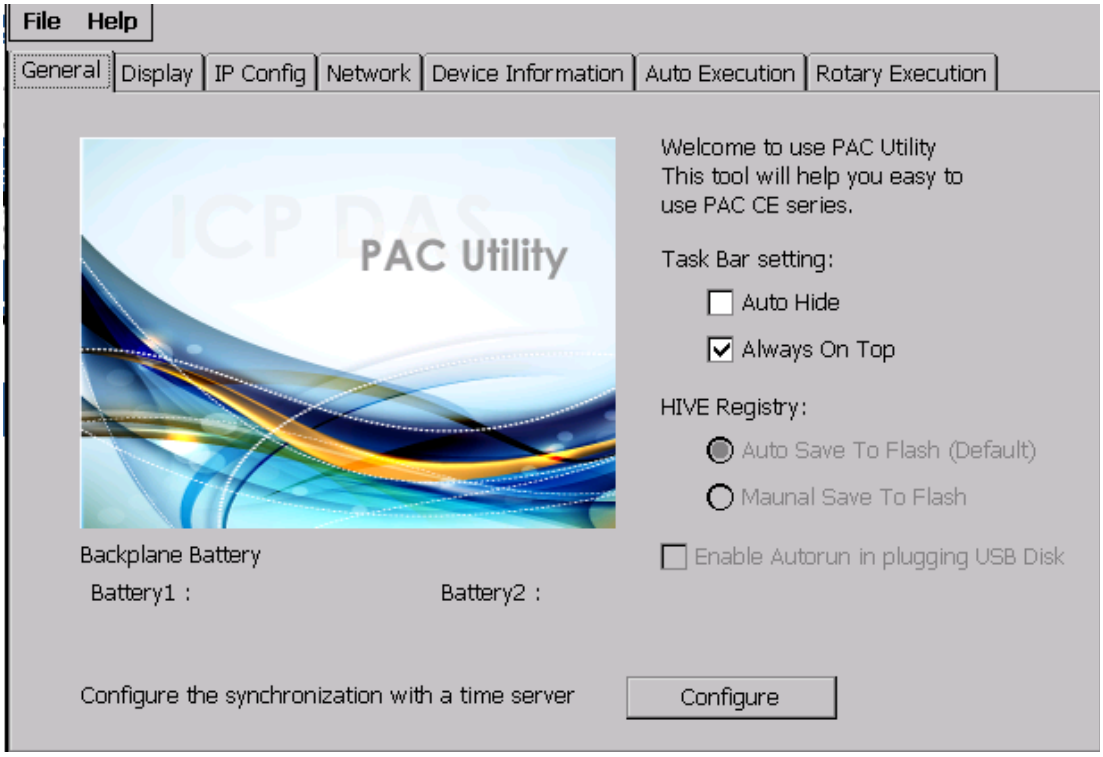
3.2.3. Property Tab - General

The General tab provides functions to configure the task bar, check the status of the battery…, etc.



The tab use to	How to use
Lock or Auto-Hide the taskbar	**Auto-Hide:** Select the **Auto Hide** check box. **Lock:** Select the **Always On Top** check box.
Check the status of the battery	See the **Battery1** and **Battery2** field that displays the display resolution.
Automatic synchronization of system time	Refer to the AppendixB.2 How to configure the service for automatically synchronizing with the internet time server.

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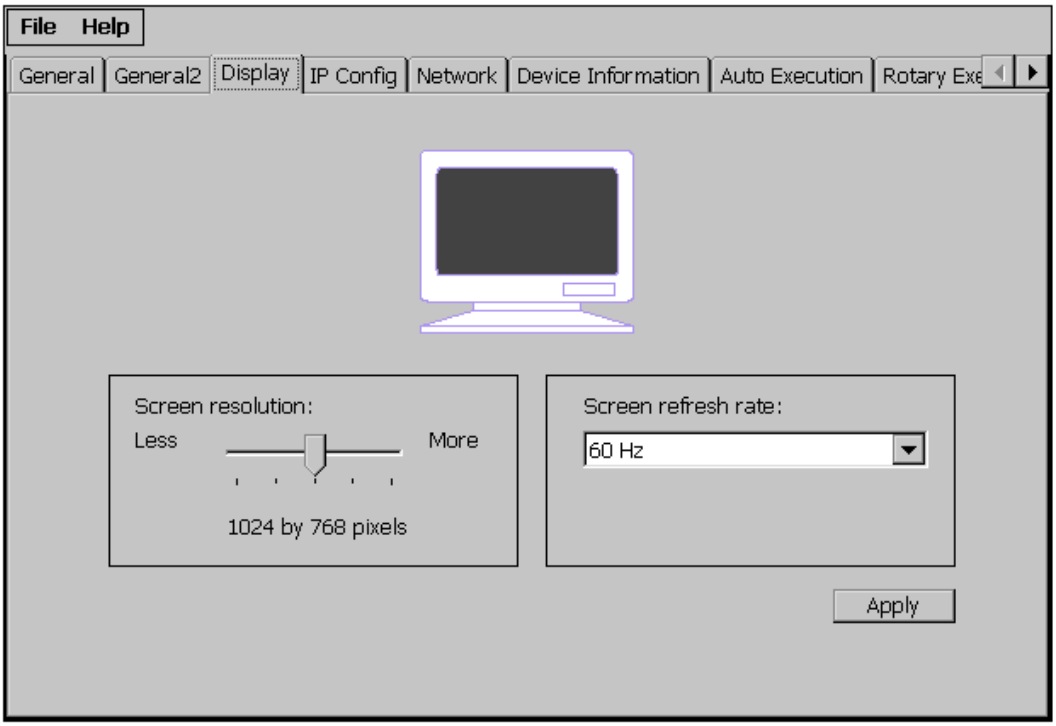
3.2.4. Property Tab – Display

The Display tab provides functions to configure the monitor settings.



The tab use to	How to use
Adjust the screen resolution	Move the slider to the left to decrease the resolution or move the slider to the right to increase the resolution, and then click the **Apply** button.
Change the screen refresh rate	Select the desired refresh rate from the **Screen refresh rate** drop-down list, and then click the **Apply** button.

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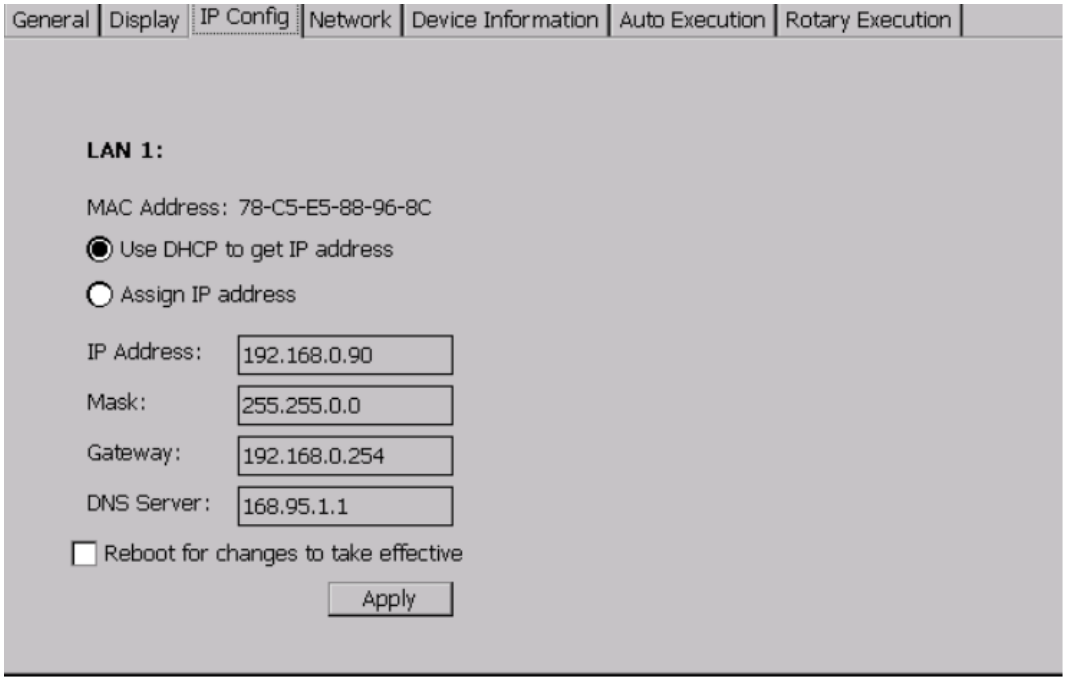
3.2.5. Property Tab – IP Config

The IP Config tab provides functions to configure either DHCP (Roaming) or manually configured (Static) network settings and to monitor the MAC address. Generally, DHCP is the default settings, but if you don't have a DHCP server, you must configure the network settings by using manual configuration.



The tab use to	How to use
Configure the network settings	**Obtaining an IP address automatically from DHCP:** Select the **Use DHCP to get IP address** option, and then click the **Apply** button. **Manually assign an IP address:** Select the **Assign IP address** option, and then click the **Apply** button.

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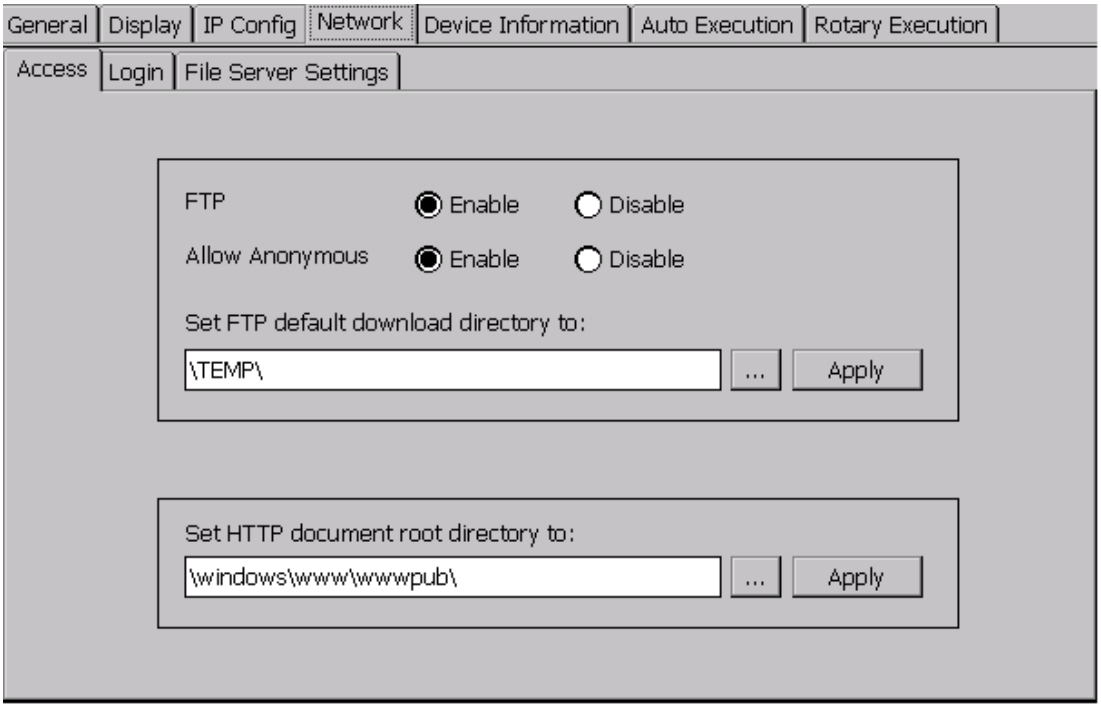
3.2.6. Property Tab – Network

The Network tab comprises two tabs - Access and Login.

Access

The Access tab provides functions to enable/disable the FTP access, enable/disable anonymous FTP access, and configure the FTP and HTTP directory path.



The tab use to	How to use
Enable or disable the FTP access	**Enable:** Select the **Enable** check box in the FTP field, and then click the **Apply** button. **Disable:** Select the **Disable** check box in the FTP field, and then click the **Apply** button.

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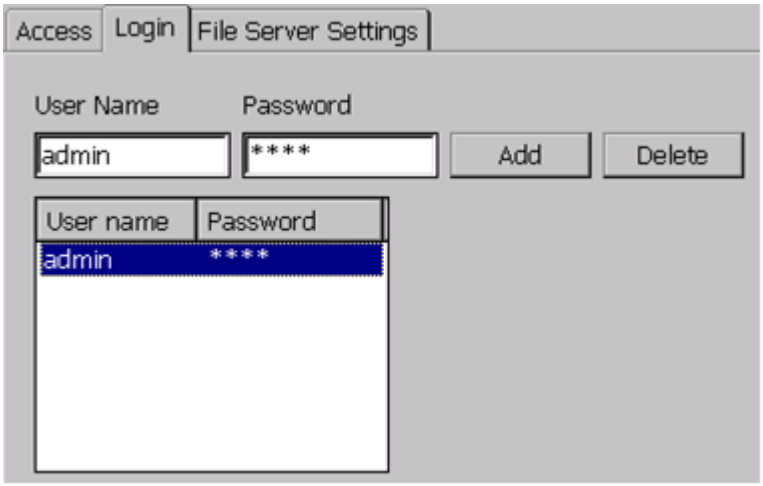
The tab use to	How to use
Enable or disable anonymous FTP access	**Enable:** Select the Enable check box in the Allow Anonymous field, and then click the **Apply** button. **Disable:** Select the Disable check box in the Allow Anonymous field, and then click the **Apply** button.
Change the FTP directory path	Enter a new path in the **Change FTP default download directory** field, and then click the **Apply** button.
Change the HTTP directory path	Enter a new path in the C**hange HTTP document root directory \windows\www\wwwsub to** field, and then click the **Apply** button.

Login

The Login tab provides functions to maintain the FTP accounts.



The tab use to	How to use
Maintain the FTP accounts	Refer to the Appendix C.1 How to add a user account to remote login the WinPAC from PC.

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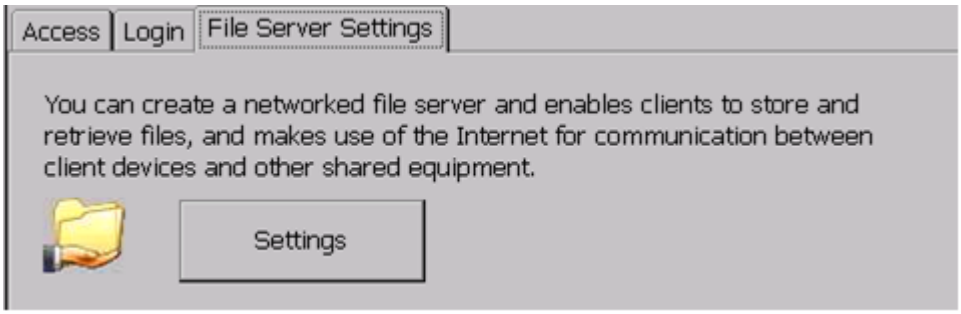
FTP Server Settings

The FTP Server Settings tab provides functions to set the SMB server.



The tab use to	How to use
Set the SMB server	Click the Settings button to set the SMB server path.

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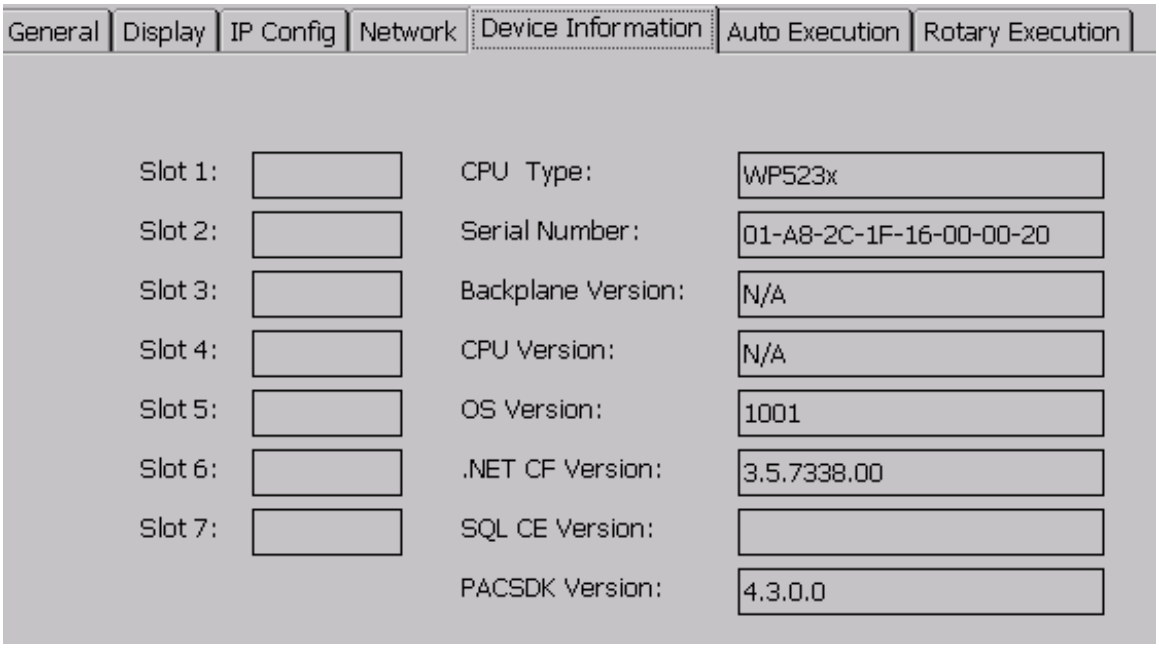
3.2.7. Property Tab – Device Information

The Device Information tab provides functions to monitor necessary system information of the WinPAC. The information is the most important note of version control for upgrading system.



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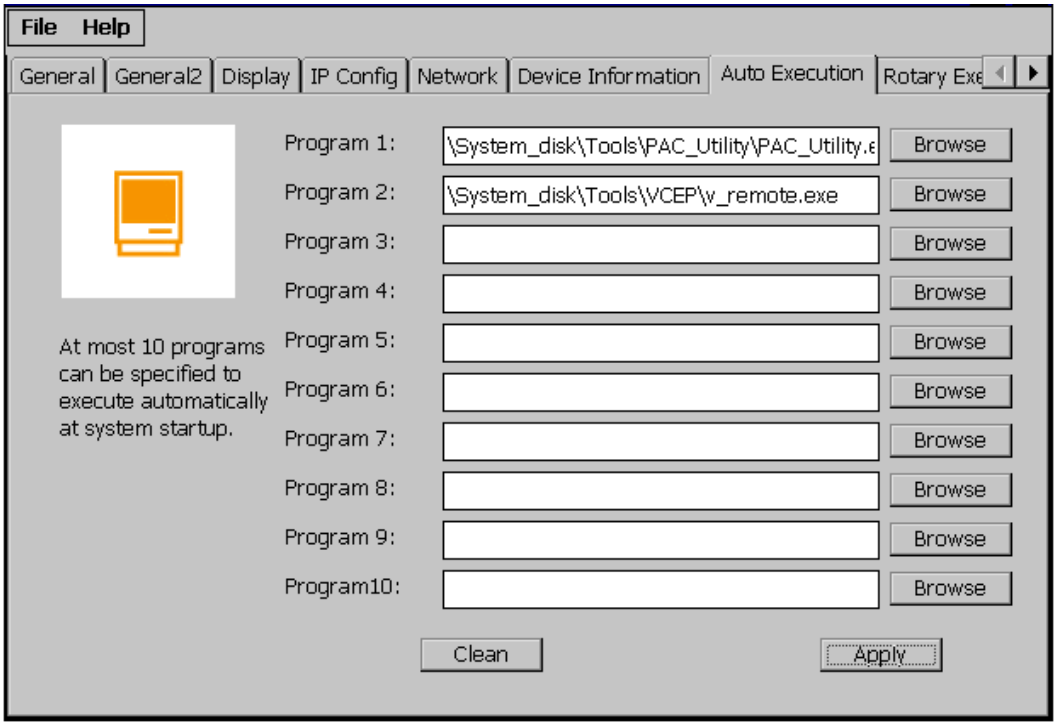
3.2.8. Property Tab – Auto Execution

The Auto Execution tab provides functions to configure programs running at WinPAC startup, it allows users to configure ten execute files at most.

Tips & Warnings

The specific extensions are .exe and .bat, and they are executed in order of program 1, program 2, etc.



The tab use to	How to use
Configure programs running at startup	Click the **Browse** button to select the execute file which you want, and then click the **Apply** button.

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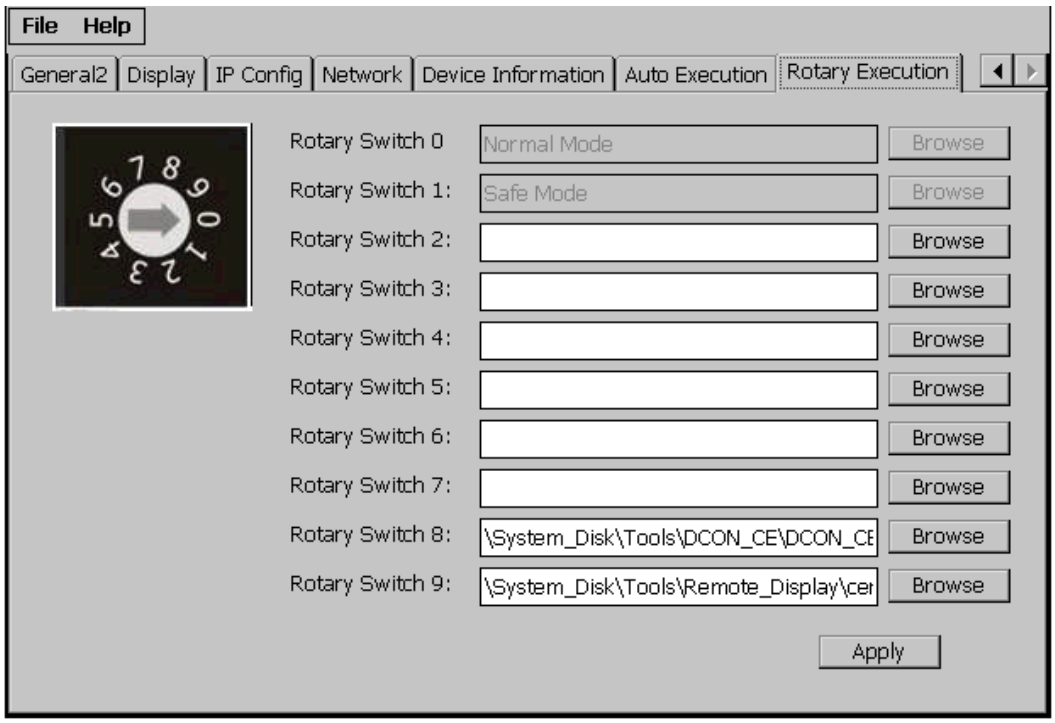
3.2.9. Property Tab – Rotary Execution

The Rotary Execution tab provides functions to configure programs running at WinPAC startup in one of the user defined mode, it allows users to configure ten execute files at most.



The tab use to	**How to use**
Configure programs running at startup in one of the user defined mode	Click the **Browse** button to select the execute file which you want, and then click the **Apply** button.

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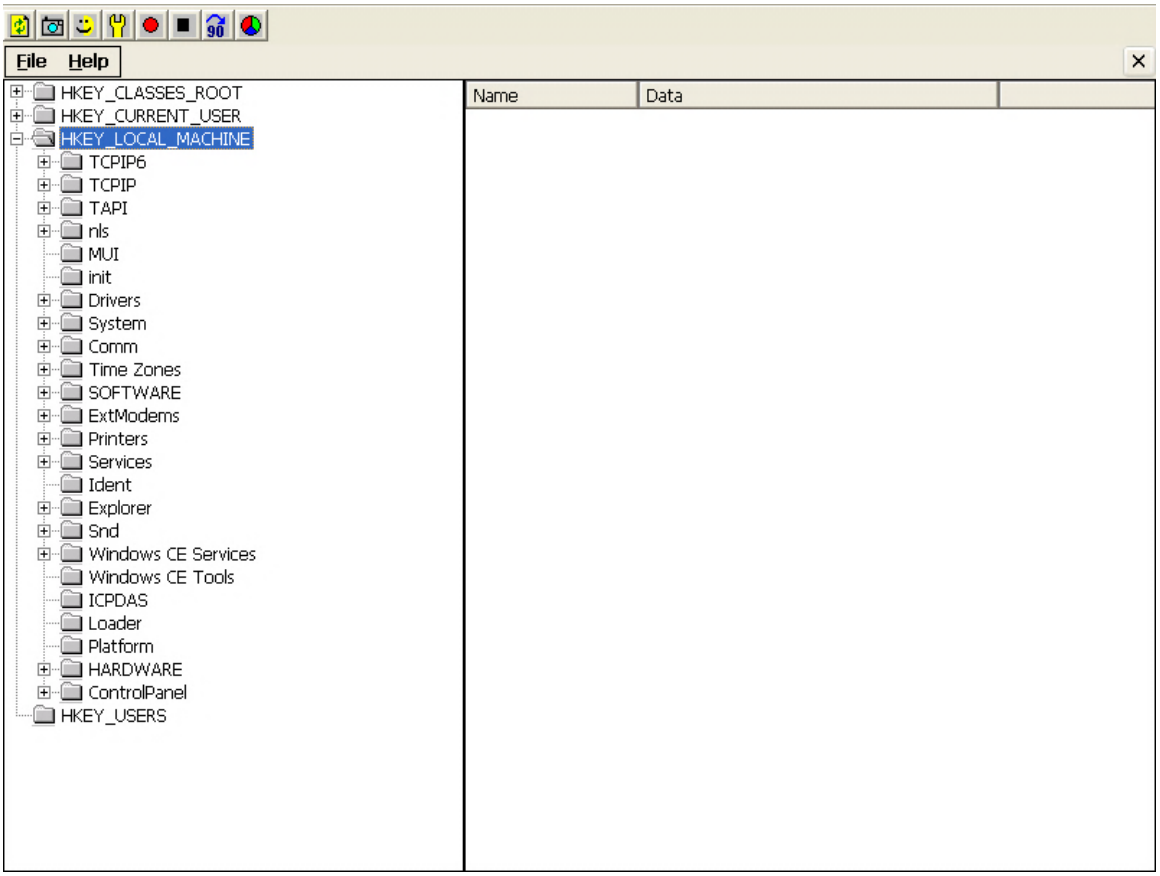
3.3. RegEdit

The RegEdit provides a hierarchical representation of the registry on a target computer, similar in appearance to the Windows Registry Editor. The standard registry roots are represented; you can add keys beneath a root to point to existing registry keys, or you can add your own keys. Values can be changed for existing keys, or added for new keys, and default keys can be specified. For more information, see Registry Settings Management in Deployment.



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3.4. Remote_Display

The "Remote Display" allows WinPAC to be controlled and monitored from a remote location. This tool is composed of two parts, a client and a server. The server is a program named cerdisp.exe running on WinPAC. The client is a PC-based program named cerhost.exe running on the PC.

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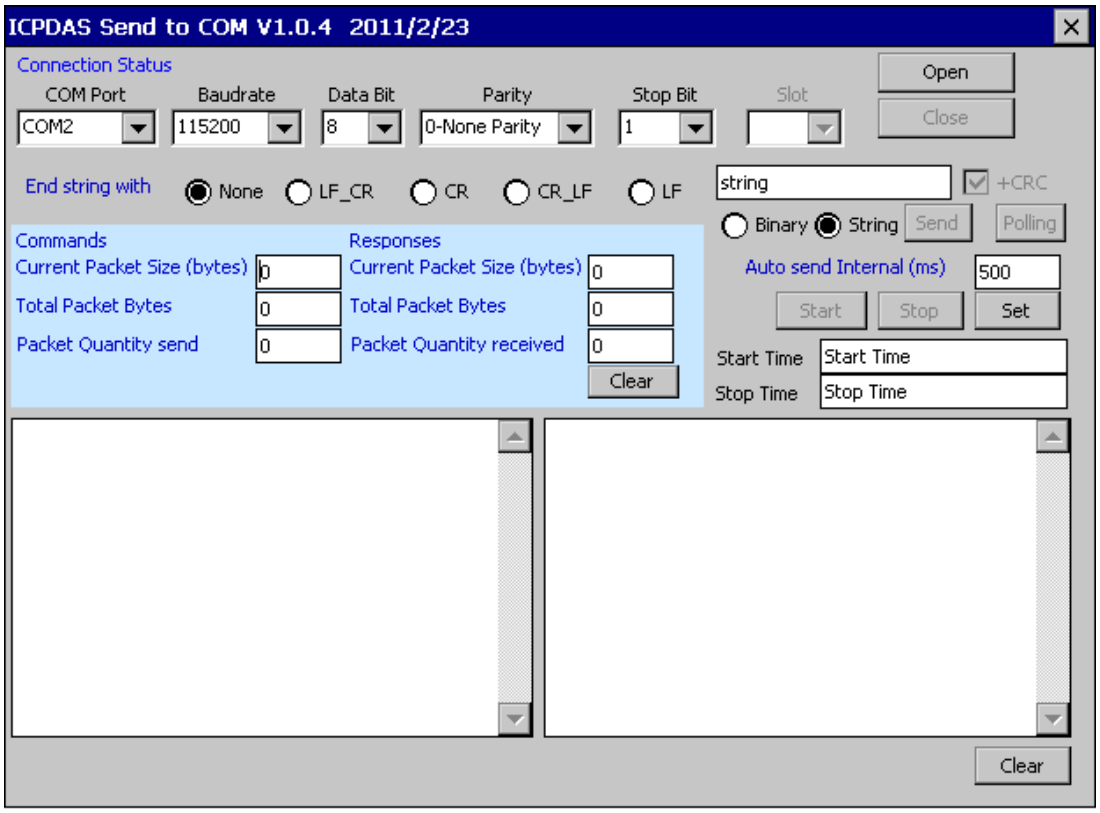
3.5. Send ToCOM

The SendToCOM uses the serial port to communicate with expansion module. To use the SendToCOM, you can send data to expansion module through the serial port, and receive data from other device through the serial port.

For more information about these commands for communicating with expansion module, please refer to:
CD:\Napdos\io_module\87k_high_profile_modules.htm



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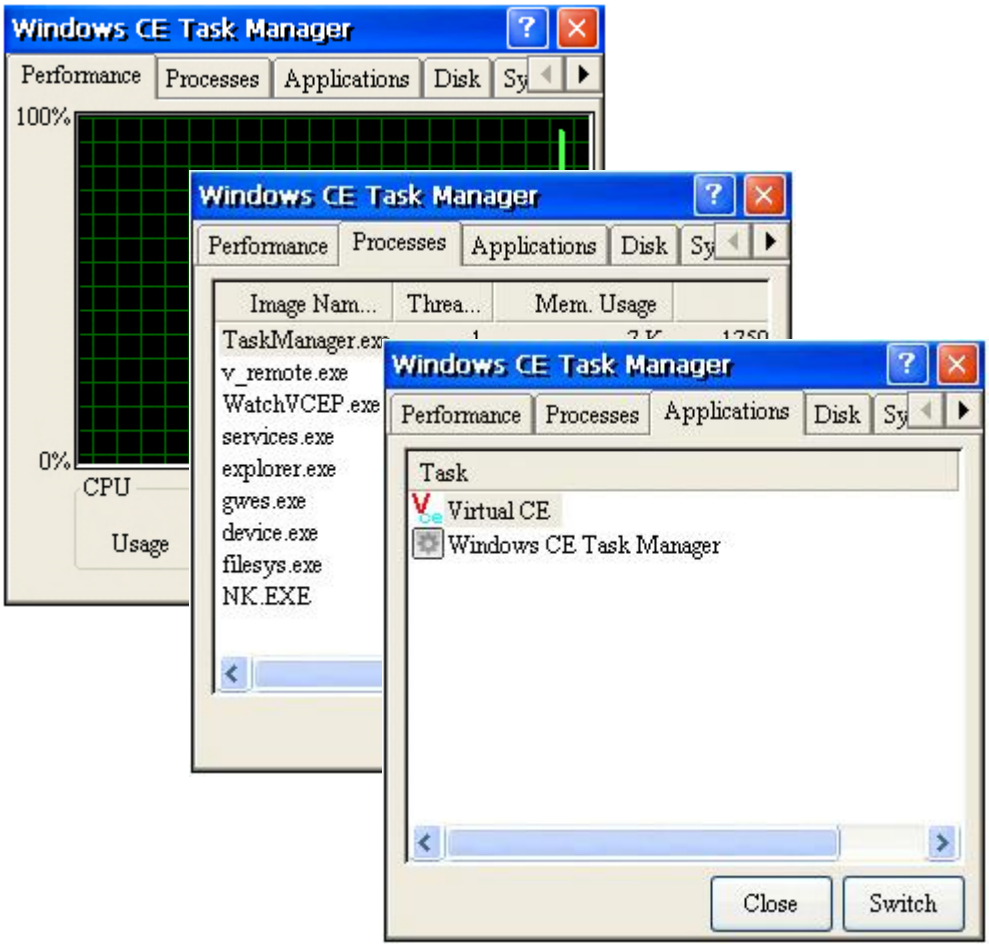
3.6. TaskMgr

The TaskMgr is a Windows CE application, which provides real time info on all processes and threads including System threads, similar in appearance to the Windows Task Manager.



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3.7. VCEP

ICPDAS VCEP is designed for managing your WinPAC anywhere. No matter where you are, ICPDAS VCEP provides a convenient environment on the Desktop PC and lets you control your WinPAC remotely.

ICPDAS VCEP is composed of two main components: The “Server” which runs on WinPAC and the ‘Client’ which runs on a Desktop PC.

Once a connection is established between the client and server (initiated by the client), the client will periodically send requests for screen updates and send mouse/key click information to the server to simulate.

Each video frame is inter-compressed against the previous frame and then intra-compressed with a modified LZW scheme to minimize the amount of data transmitted from server to client.

For more detailed information on VCEP application, please refer to ftp://ftp.icpdas.com.tw/pub/cd/winpac/napdos/wp-8x4x_ce50/pc_tools/vcep_4.2.0.9/

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3.8. Remote_Display_Application

The "Remote Display" is a Windows CE functionality that allows WinPAC to be controlled and monitored from a remote location. This tool is composed of two parts, a client and a server. The server is a program named cerdisp.exe running on WinPAC. The client is a PC-based program named cerhost.exe running on the PC.

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4. Your First WinPAC Program

This chapter provides a guided tour that describes the steps needed to set-up a development environment, download, install, configure for user programming with the WP-5231 series modules.

Before writing your first program, ensure that you have the necessary development tool and the corresponding WinPAC SDKs are installed on your system.

Development Tools

WP-5231 series modules are a Windows CE-based unit. Windows CE is a mature embedded operating system which supports rapid development. Three standard development tools are list as follows which are highly integrated, with comprehensive support for developing applications of Windows CE-based WinPAC.

- Visual Basic.net
- Visual C#
- Visual C++

Tips & Warnings

1.There is no support for development of both managed and unmanaged code on WinPAC series platform in VS2003/VS2005/2010/VS2012.

2. WinCE-based platform development is only supported in Visual studio Professional edition or better, no Express or Standard edition.

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4.1. Preparing the Development Tools

WP-5231 is a Windows CE-based unit. Windows CE is a mature embedded operating system which supports rapid development. The standard development tool is list as follows which is highly integrated, with comprehensive support for developing applications of Windows CE-based WP-5231.

- **Visual Studio 2008**

WP-5231 has .NET Compact Framework 3.5 installed. Visual Studio 2008 takes full advantage of the .NET Compact Framework, which uses public Internet standards to enable integration with new and existing applications running on any platform. Supported languages include Visual C#, Visual C++ and Visual Basic .NET.

Installation Steps:

1. **Visual Studio 2008 Professional**

   Purchase from MSDN subscription

   Microsoft DreamSpark:
   https://www.dreamspark.com/Product/Product.aspx?productid=1

2. **Visual Studio 2008 Service Pack 1**

   http://www.microsoft.com/en-us/download/details.aspx?id=10986

3. **Visual Studio 2008 update for Windows Embedded Compact 7**

   http://www.microsoft.com/en-us/download/confirmation.aspx?id=11935

4. **Windows Embedded Compact 7 ATL Update for Visual Studio 2008 SP1**

   http://support.microsoft.com/kb/2468183/en-us

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4.2. Installing WP-5231 SDK

The WinPAC SDK is a Software Development Kit (SDK) that contains C header files, C libraries and documents.

Step 1: Insert the CD into your CD-ROM drive

Step 2: Execute the "AM335x_WINCE7_SDK_YYYYMMDD.msi"

The AM335x_WinCE7_SDK_YYMMDD.msi can be obtained from:
CD:\WinPAC_AM335x\Wp-5231\SDK\PlatformSDK\
ftp://ftp.icpdas.com/pub/cd/WinPAC_AM335x/Wp-5231/SDK/PlatformSDK/

The installation program for the latest version of the WinPAC Platform SDKs can be obtained from:
ftp://ftp.icpdas.com/pub/cd/WinPAC_AM335x/Wp-5231/SDK/PlatformSDK/

File name: am335x_wince7_sdk_yyyymmdd.msi
yyyymmdd: platform sdk released date

Step 3: Follow the prompts until the installation is complete

Step 4: Execute the "VisualStudioDeviceWindowsEmbeddedCompact7.msi"

The VisualStudioDeviceWindowsEmbeddedCompact7.msi can be obtained from:
CD:\WinPAC_AM335x\Wp-5231\SDK\PlatformSDK\
ftp://ftp.icpdas.com/pub/cd/WinPAC_AM335x/Wp-5231/SDK/PlatformSDK/

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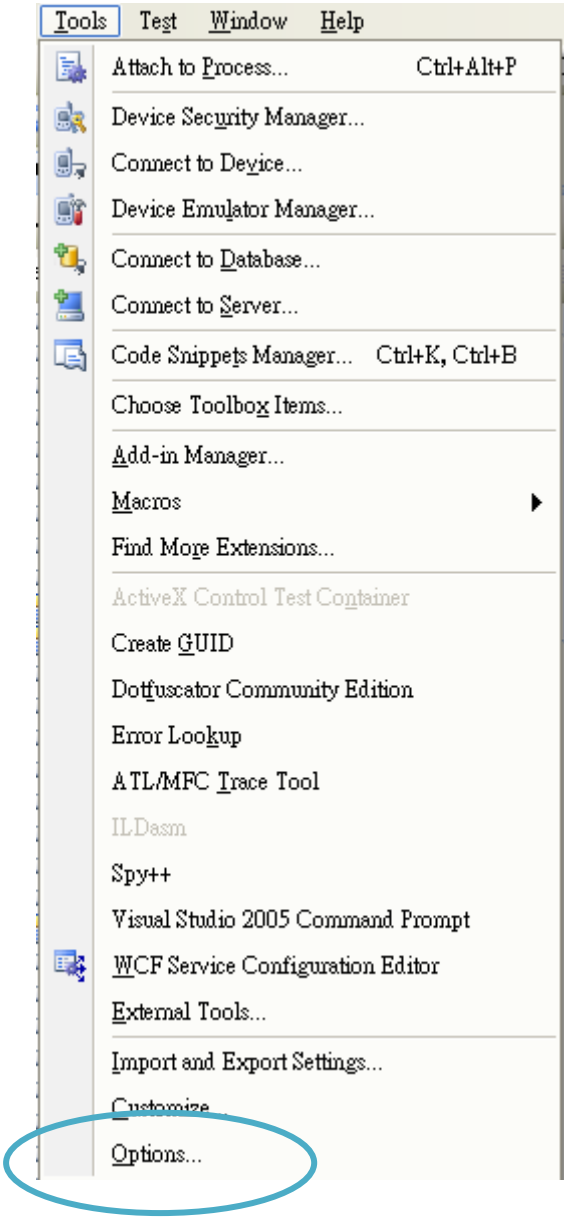
Step 5: Execute any VS2008 C++ project include the AM335x_WINCE7_SDK(ARMv4I) platform and the click the "Tools"->"Options…"



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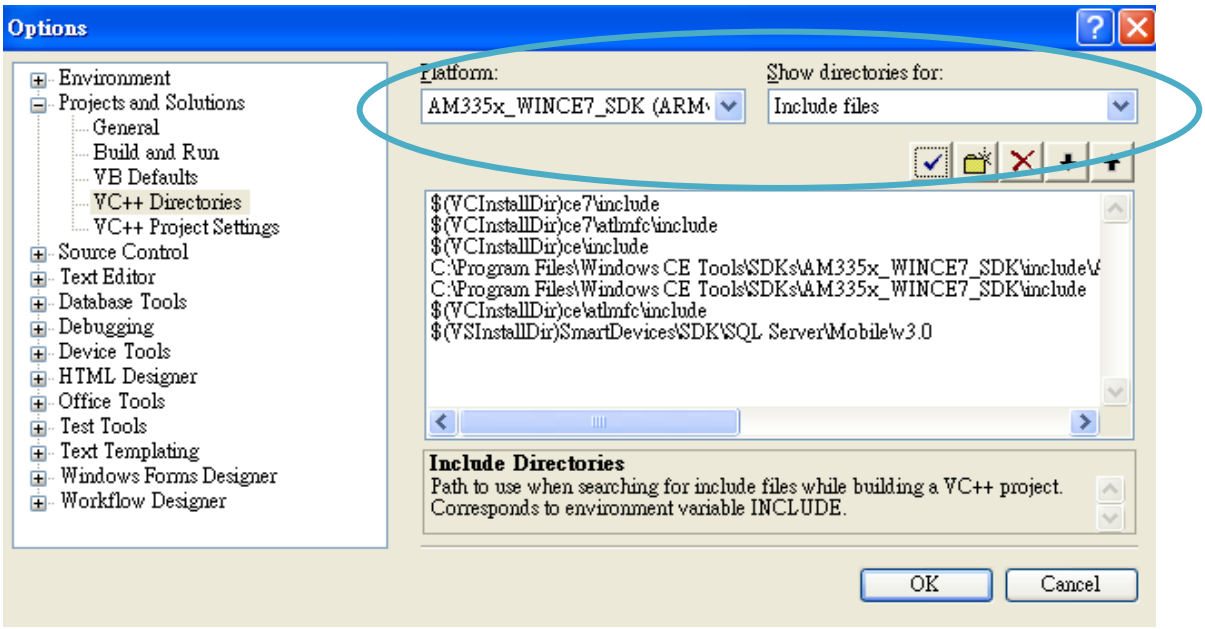
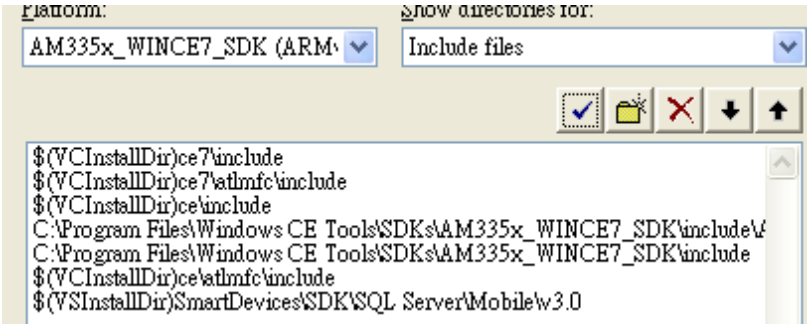
Step 6: Click the “Projects and Solutions”->”VC++ Directories” and then select the “AM335x_WINCE7_SDK (ARMv4I)”、“Include files” at “Platform:” and “Show directories for:” item



Step 7: Add the path “$(VCInstallDir)ce7\include” and “$(VCInstallDir)ce7\atlmfc\include” and then click the OK button.



Tips & Warnings

The path “$(VCInstallDir)ce7\include” and “$(VCInstallDir)ce7\atlmfc\include” must be on the top of box.

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4.3. First WinPAC Program in VB.NET

The best way to learn programming with WinPAC is to actually create a WinPAC program.

The example below demonstrates how to create a demo program running on WinPAC with VB.NET.

To create a demo program with VB.NET that includes the following main steps:

1. Create a new project
2. Specify the path of the PAC reference
3. Add the control to the form
4. Add the event handling for the control
5. Upload the application to WP-5231
6. Execute the application on WP-5231

All main steps will be described in the following subsection.

In this tutorial, we will assume that you have installed WP-5231 SDK on PC and used the Visual Studio 2008 for application development.

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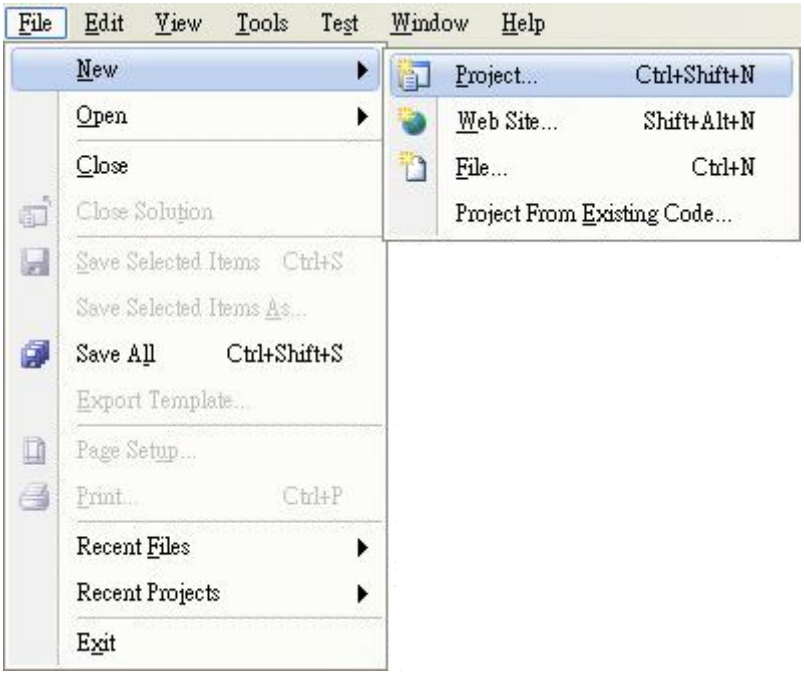
4.3.1. Create a New Project

The Visual VB.net project template is a composite control that you use in this example creates a new project with this user control.

Step 1: Run the Visual Studio 2008

Visual Studio 2008

Step 2: On the File menu, point to New, and then click Project



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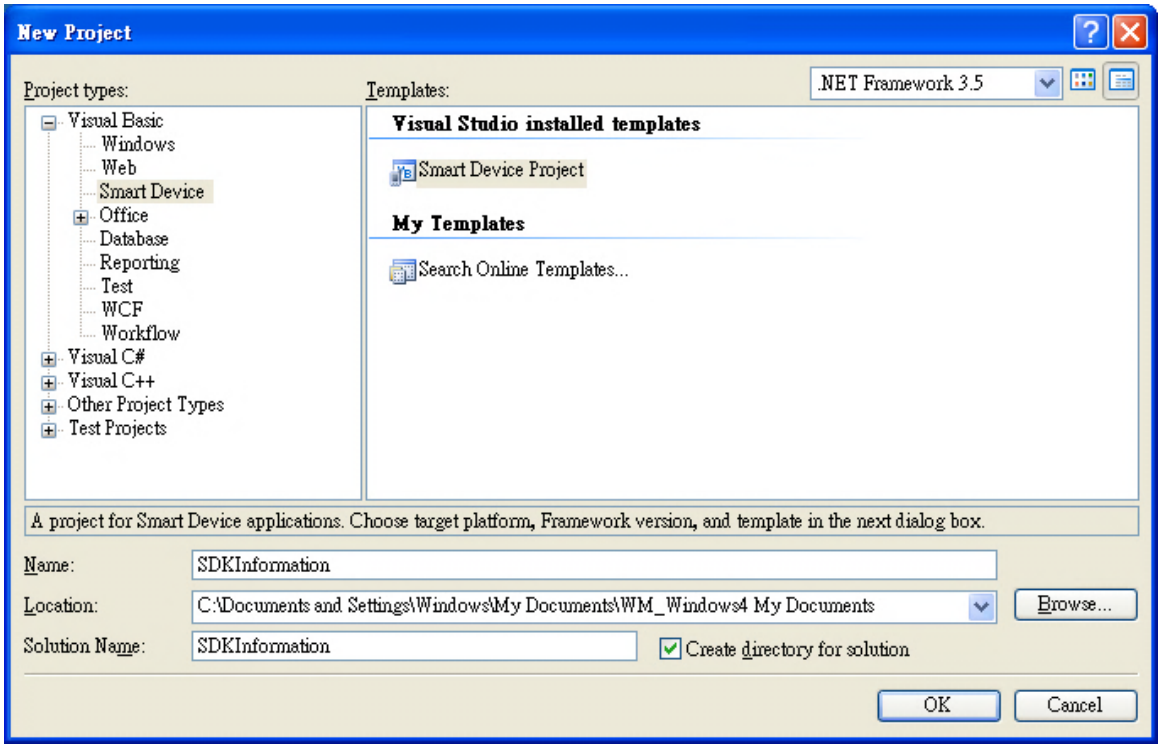
Step 3: In the Project types pane, expand Visual Basic, and then click Smart Device

Step 4: In the Templates pane, click Smart Device

Step 5: Type a name in the Name field, and then click OK

Here we will enter the name “SDKInformation” and a different location for the project if you wish



Tips & Warnings

The WCE7 only support .NET Compact Framework Version 3.5, if your application uses .NET Compact Framework Version 2.0 there is no guarantee that the program will function correctly.

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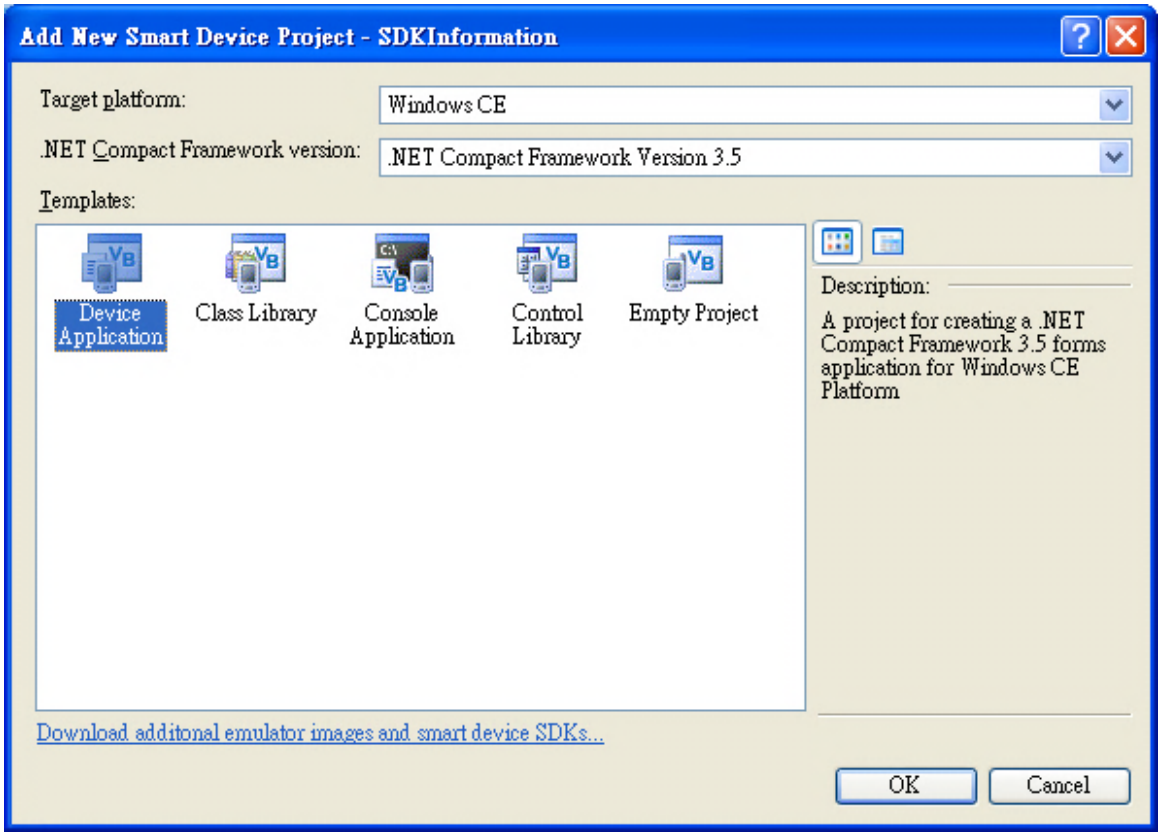
Step 6: In the Target platform item, choose Windows CE

Step 7: in the .NET Compact Formwork version item, choose .NET Compact Framework Version 3.5

Step 8: in the Templates pane, choose Device Application, and then click Next



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4.3.2. Specify the Path of PAC Reference

The PAC SDK provides a complete solution to integrate with VP-664-CE7 and it's compatible with Visual C#, Visual Basic .net and C++. In order to use a component in your application, you must first add a reference to it.

Step1: Get the PACNET.dll and copy it to the project folder

The PACNET.dll can be obtained from the link below that has been provided on the CD or by downloading the latest version from ICP DAS web site.
CD:\WinPAC_AM335x\Wp-5231\SDK\PACNET\
ftp://ftp.icpdas.com/pub/cd/WinPAC_AM335x/Wp-5231/SDK/PACNET/

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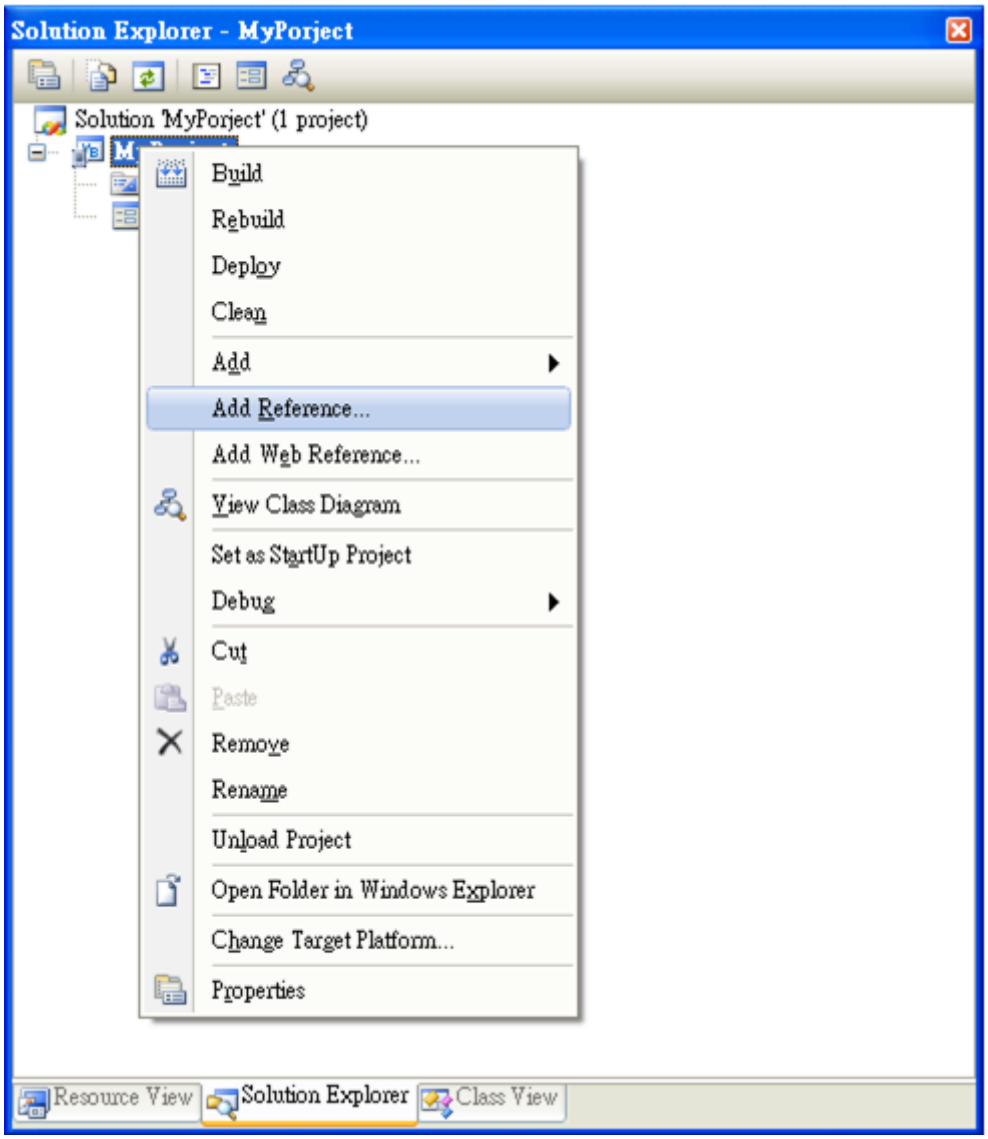
Step 2: In Solution Explorer, right-click the References node, and then click Add Reference…



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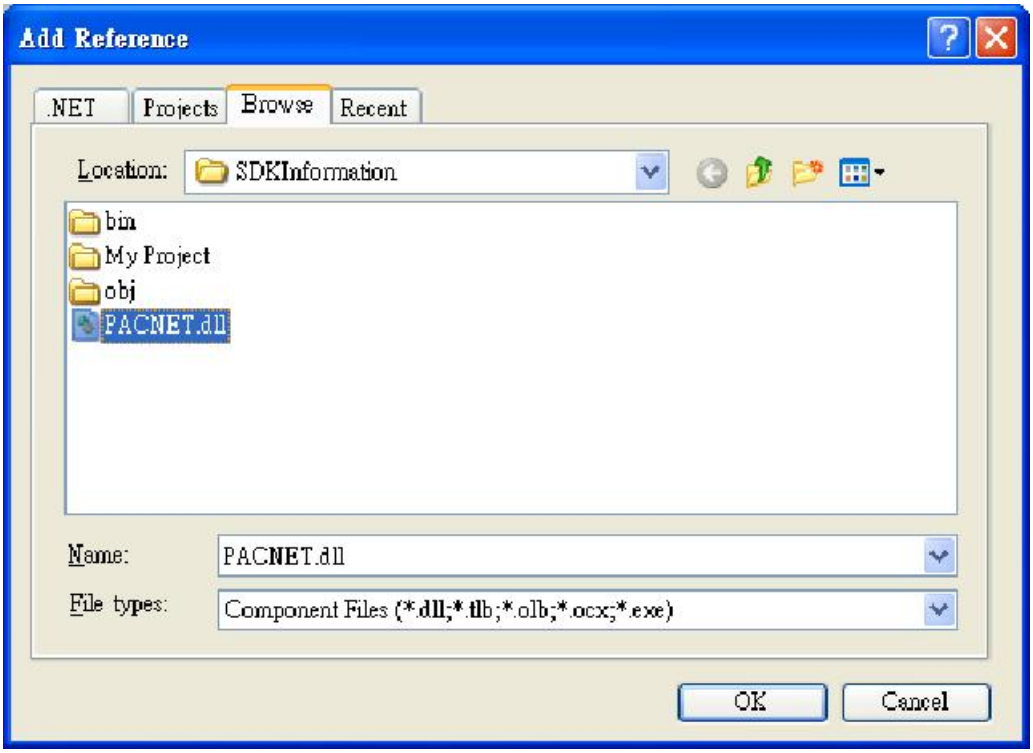
Step 3: Select Browse tab and add the PACNET.dll



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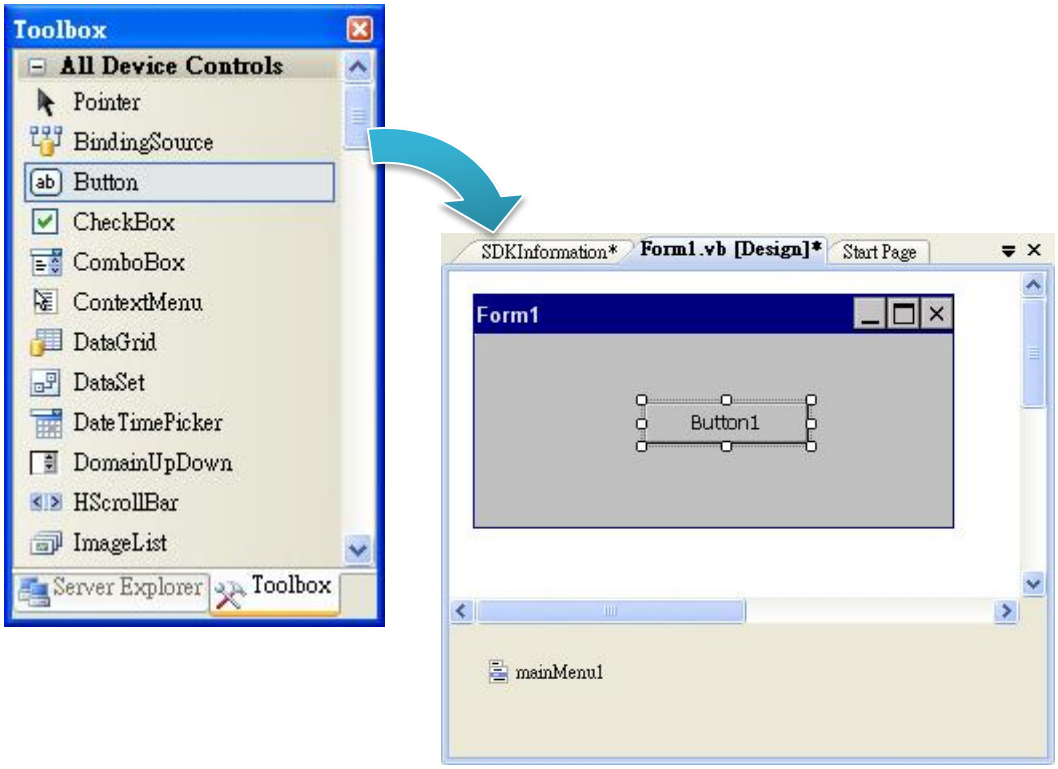
4.3.3. Add the Control to the Form

You can drag various controls from the Toolbox onto the form. These controls are not really "live"; they are just images that are convenient to move around on the form into a precise location.

After you add a control to your form, you can use the Properties window to set its properties, such as background color and default text. The values that you specify in the Properties window are the initial values that will be assigned to that property when the control is created at run time.

Step 1: From the Toolbox, drag a Button control onto the form



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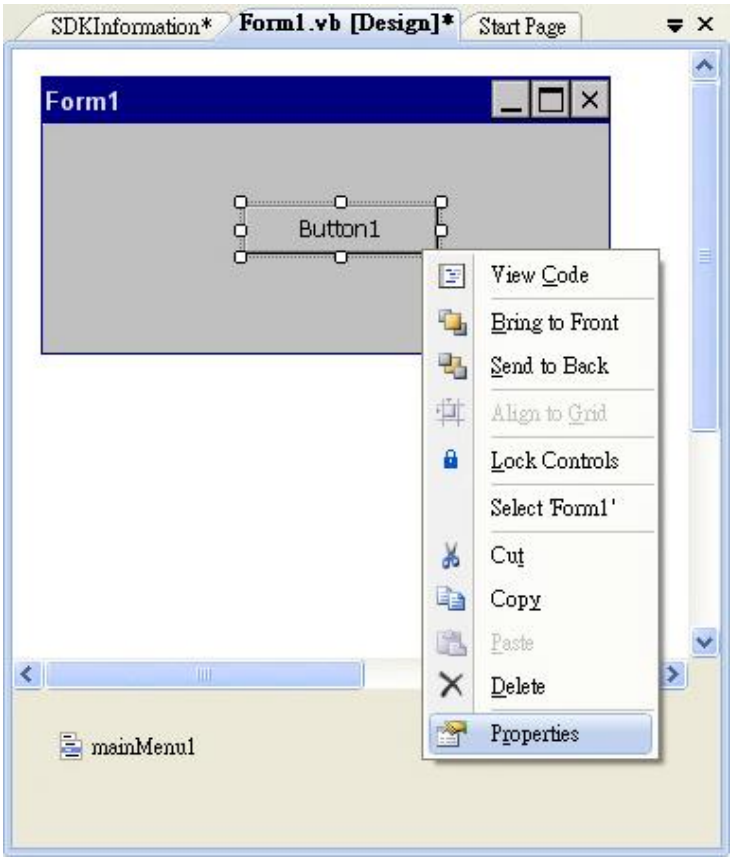
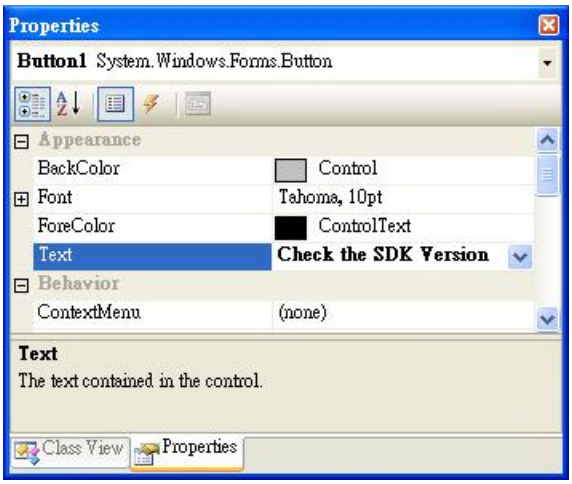
Step 2: Right-click the Button control, and then click Properties



Step 3: In the Properties window, type Check the SDK version, and press ENTER to set the Text property



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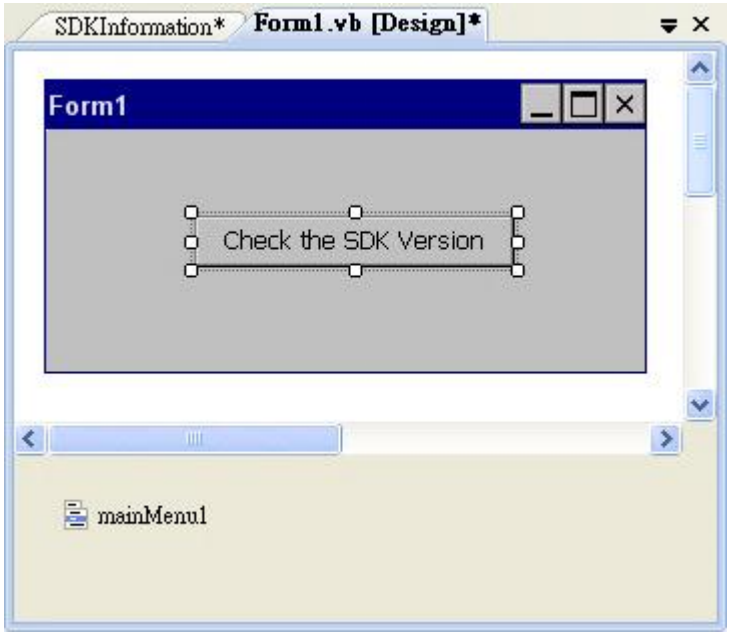
4.3.4. Add the Event Handling for the Control

You have finished the design stage of your application and are at the point when you can start adding some code to provide the program's functionality.

Step 1: Double-click the button on the form



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Step 2: Inserting the following code

Dim data(30) As Byte
PACNET.Sys.GetSDKVersion(data)
MessageBox.Show(PACNET.MISC.WideString(data))

```
Public Class Form1

    Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button1.Click
        Dim data(30) As Byte
        PACNET.System.GetSDKVersion(data)
        MessageBox.Show(PACNET.MISC.WideString(data))
    End Sub
End Class
```

Tips & Warnings

The “PACNET” of “using PACNET” is case- sensitive.

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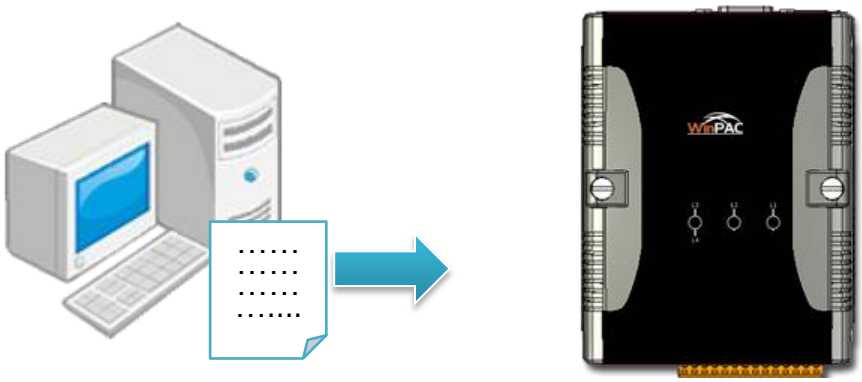
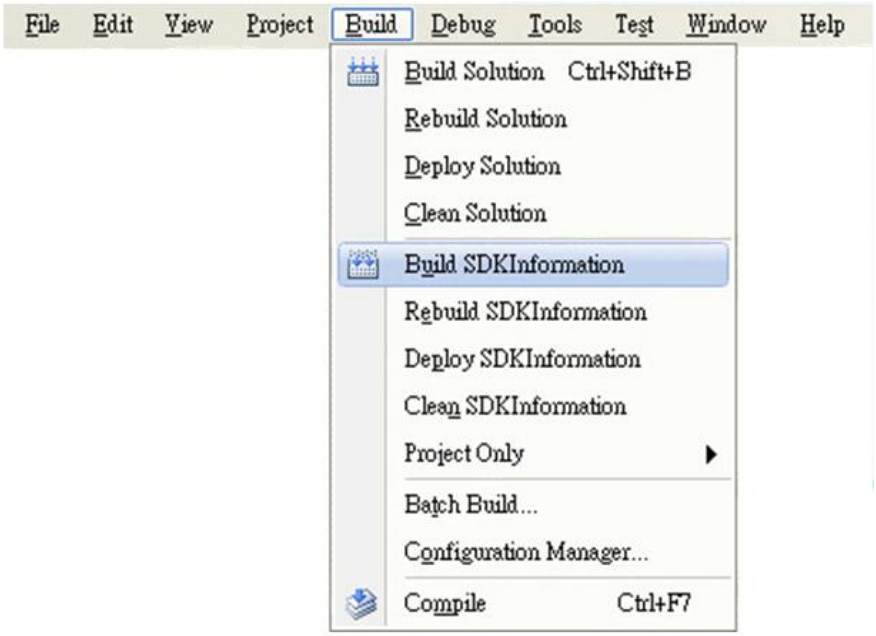
4.3.5. Upload the Application to WinPAC

WinPAC supports FTP server service. You can upload files to WinPAC or download files from a public FTP server.



Step 1: On the Build menu, click Build SDKInformation



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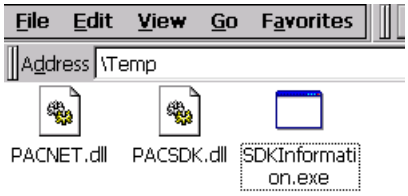
Step 2: Open the browser and type the IP address of WinPAC

Step 3: Upload the SDKInformation.exe application and the corresponding PACSDK.dll and PACNET.dll files to WinPAC

Tips & Warnings

For applications programming in C# and VB.net with .net compact framework, when executing these application on WinPAC, the corresponding PACSDK.dll and PACNET.dll must be in the same directory as the .exe file.



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4.3.6. Execute the Application on WinPAC

After uploading the application to WinPAC, you can just double-click it on WinPAC to execute it.

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4.4. First WinPAC Program in Visual C#

The best way to learn programming with WinPAC is to actually create a WinPAC program.

The example below demonstrates how to create a demo program running on WinPAC with C#.

To create a demo program with C# that includes the following main steps:

1. Create a new project
2. Specify the path of the PAC reference
3. Add the control to the form
4. Add the event handling for the control
5. Upload the application to WinPAC
6. Execute the application on WinPAC

All main steps will be described in the following subsection.

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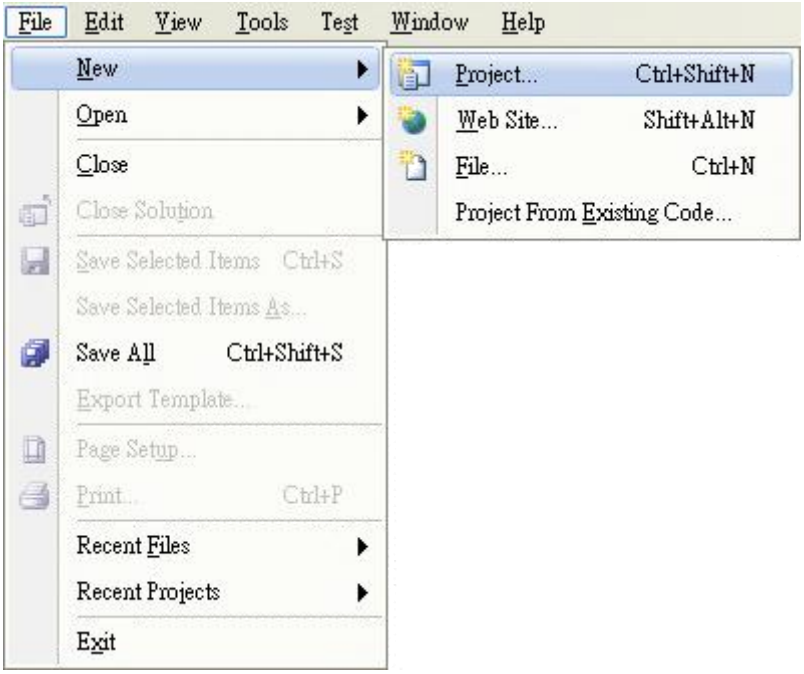
4.4.1. Create a New Project

The C# project template is a composite control that you use in this example creates a new project with this user control.

Step 1: Run the Visual Studio 2008

Visual Studio 2008

Step 2: On the File menu, point to New, and then click Project



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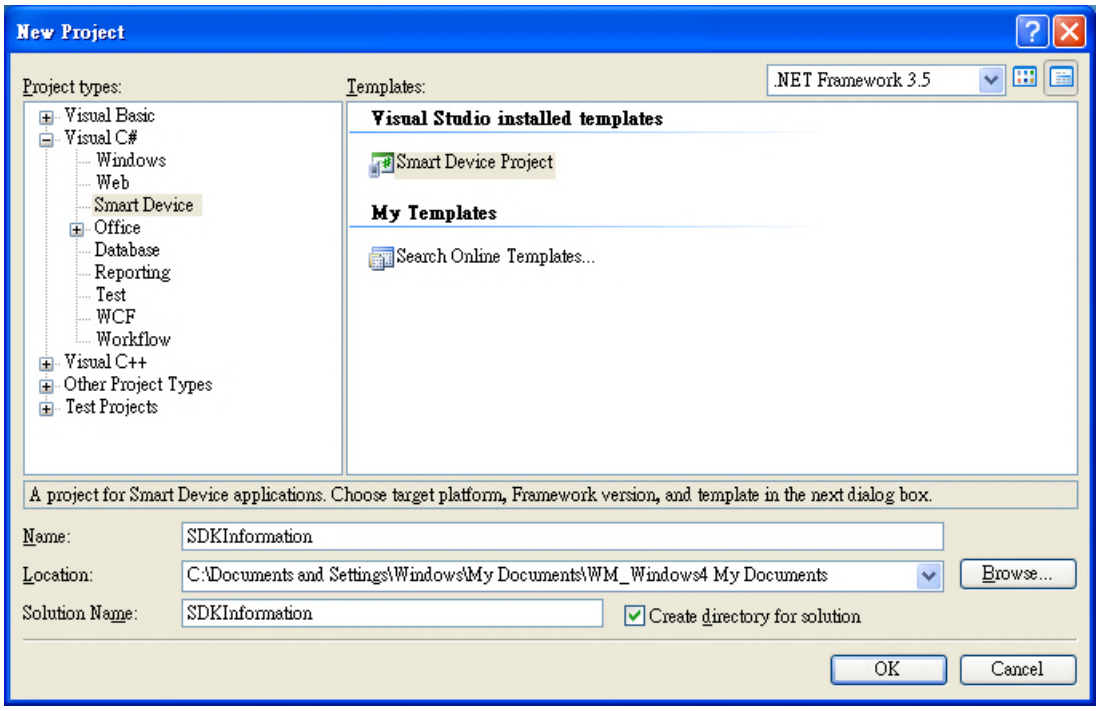
Step 3: In the Project types pane, expand Visual C#, and then click Smart Device

Step 4: In the Templates pane, click Smart Device

Step 5: Type a name in the Name field, and then click OK

Here we will enter the name “SDKInformation” and a different location for the project if you wish.



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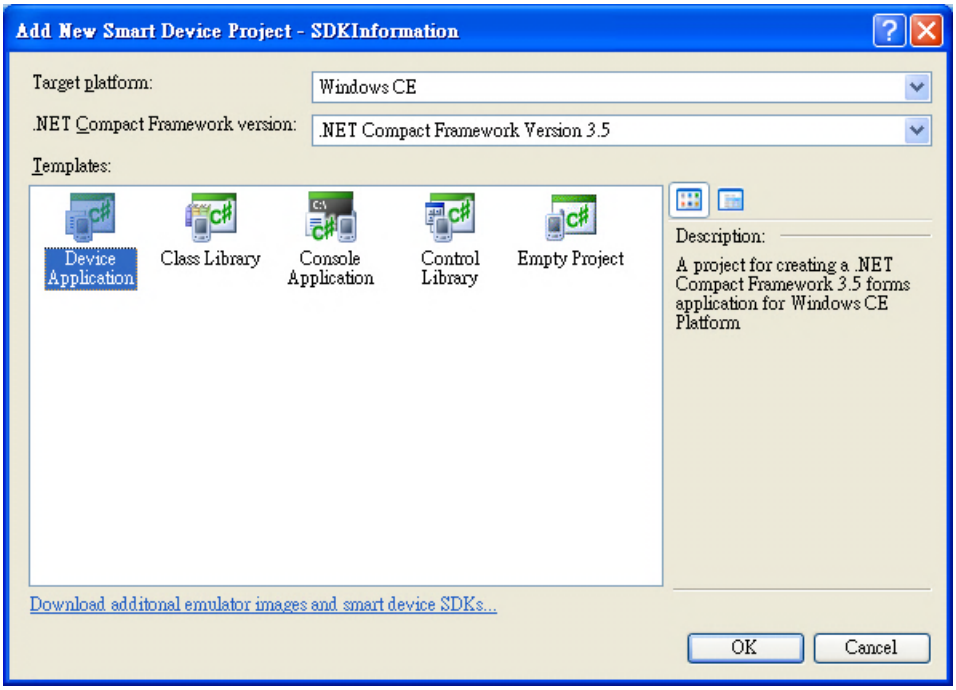
Step 6: In the Target platform item, choose Windows CE

Step 7: in the .NET Compact Formwork version item, choose .NET Compact Framework Version 3.5

Step 8: in the Templates pane, choose Device Application, and then click Next



Tips & Warnings

The WCE7 only support .NET Compact Framework Version 3.5, if your application uses .NET Compact Framework Version 2.0 there is no guarantee that the program will function correctly.

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4.4.2. Specify the Path of PAC Reference

The PAC SDK provides a complete solution to integrate with WinPAC and it's compatible with Visual C#, Visual Basic .net and C++. In order to use a component in your application, you must first add a reference to it.

Step1: Get the PACNET.dll and copy it to the project folder

The PACNET.dll can be obtained from the link below that has been provided on the CD or by downloading the latest version from ICP DAS web site.
CD:\WinPAC_AM335x\Wp-5231\SDK\PACNET\
ftp://ftp.icpdas.com/pub/cd/WinPAC_AM335x/Wp-5231/SDK/PACNET/

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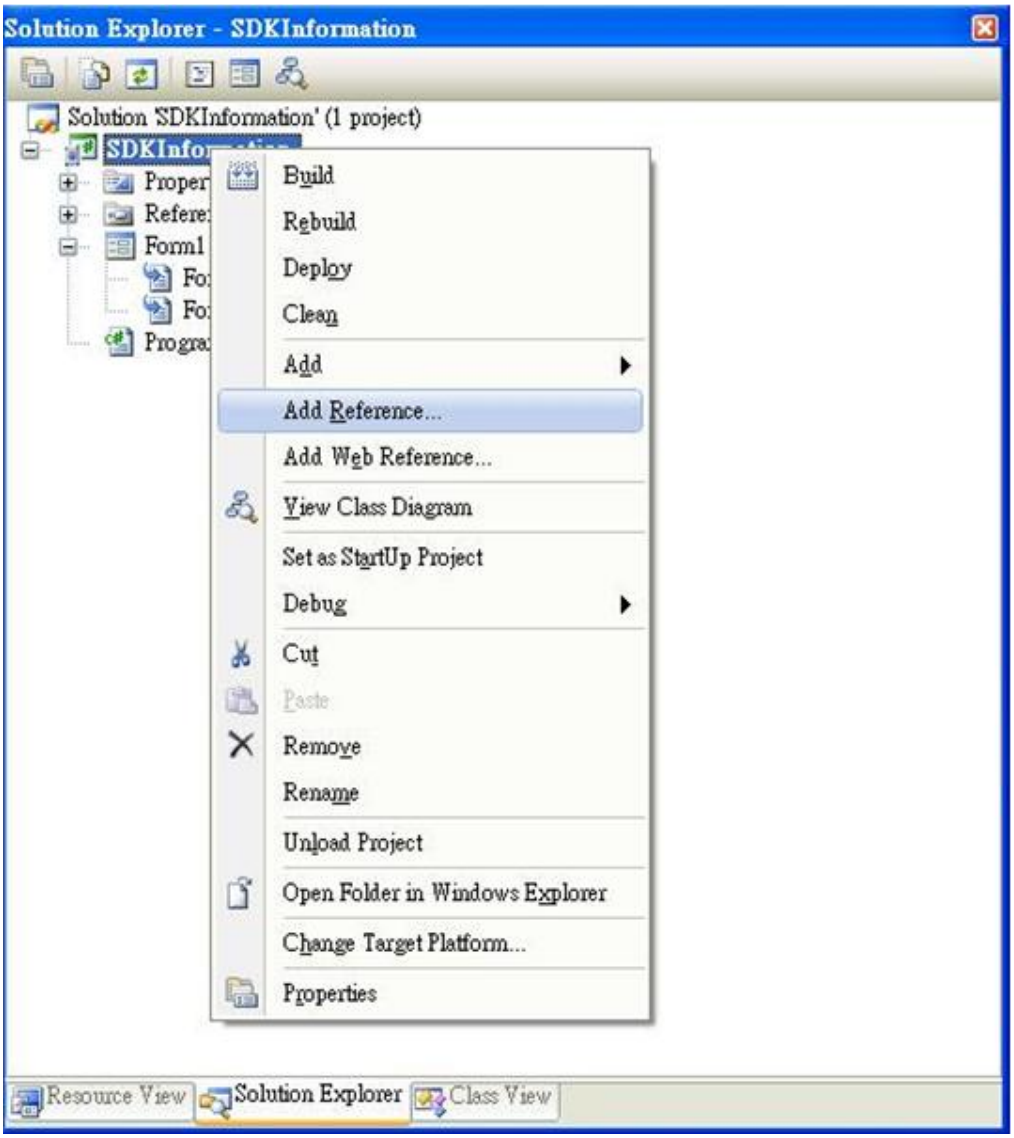
Step 2: In Solution Explorer, right-click the References node, and then click Add Reference…



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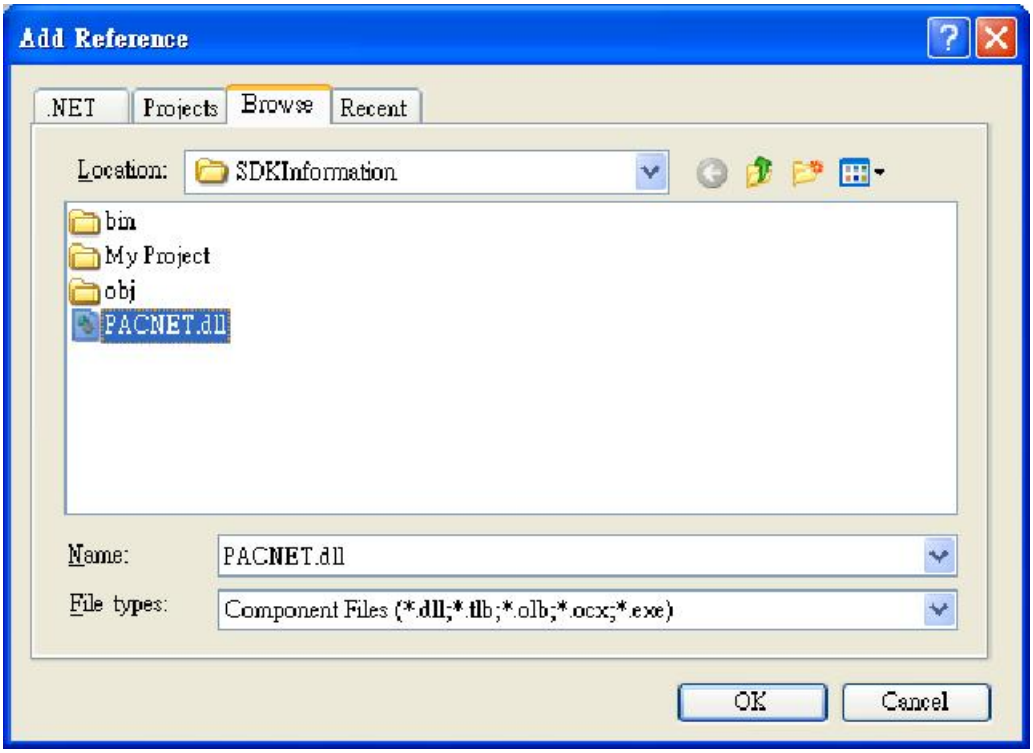
Step 3: Select Browse tab and add the PACNET.dll



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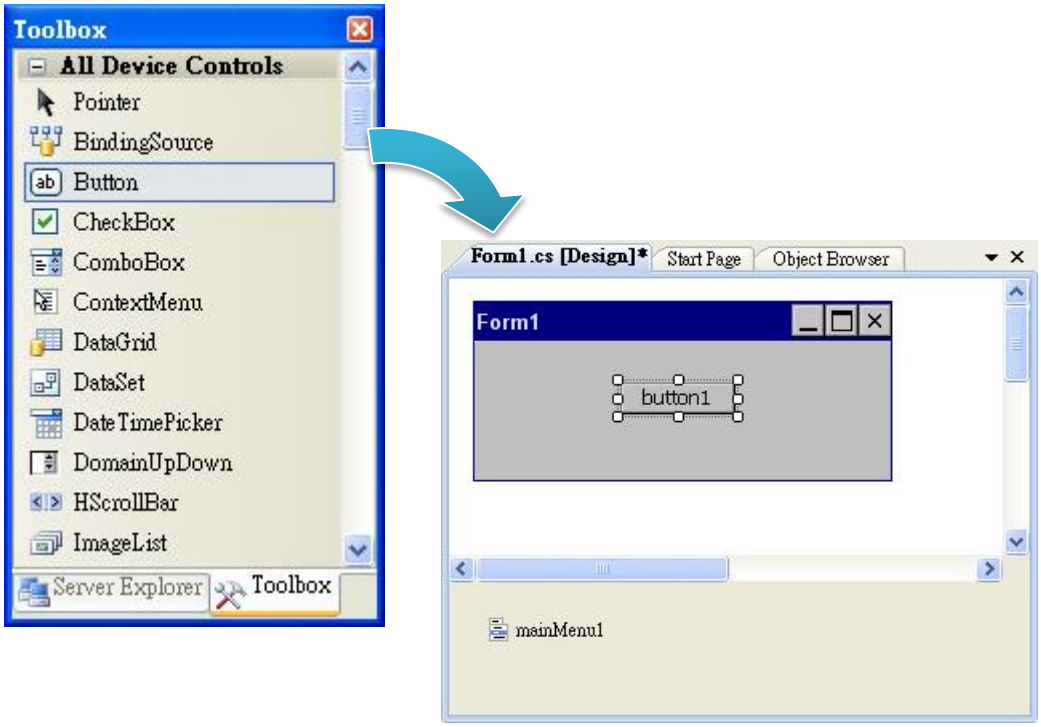
4.4.3. Add the Control to the Form

You can drag various controls from the Toolbox onto the form. These controls are not really "live"; they are just images that are convenient to move around on the form into a precise location.

After you add a control to your form, you can use the Properties window to set its properties, such as background color and default text. The values that you specify in the Properties window are the initial values that will be assigned to that property when the control is created at run time.

Step 1: From the Toolbox, drag a Button control onto the form



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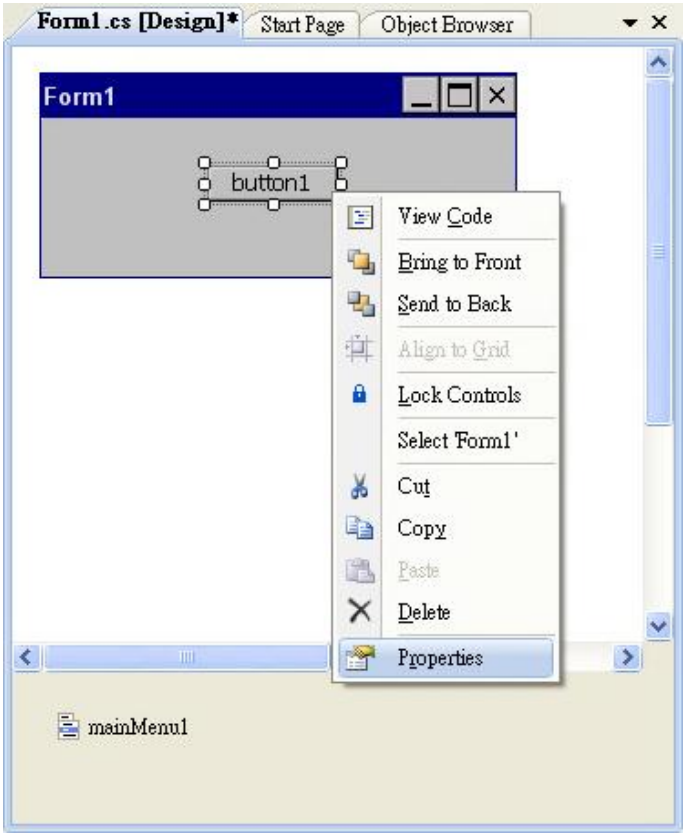
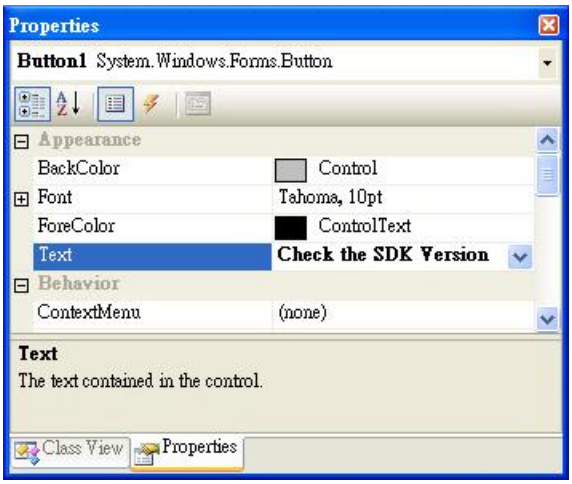
Step 2: Right-click the Button control, and then click Properties



Step 3: In the Properties window, type Check the SDK version, and press ENTER to set the Text property



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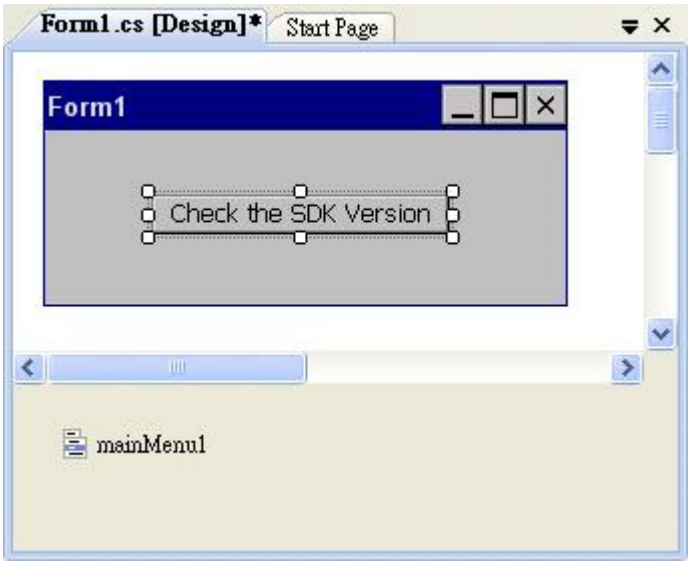
4.4.4. Add the Event Handling for the Control

You have finished the design stage of your application and are at the point when you can start adding some code to provide the program's functionality.

Step 1: Double-click the button on the form



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Step 2: Inserting the following code

byte []data = new byte[30];
PACNET.Sys.GetSDKVersion(data);
MessageBox.Show(PACNET.MISC.WideString(data));

```
namespace SDKInformation
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }

        private void button1_Click(object sender, EventArgs e)
        {
            byte []data = new byte[30];
            PACNET.Sys.GetSDKVersion(data);
            MessageBox.Show(PACNET.MISC.WideString(data));

        }
    }
}
```


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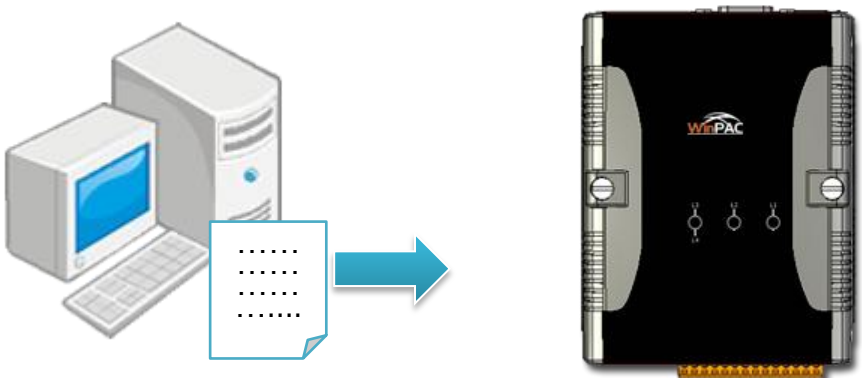
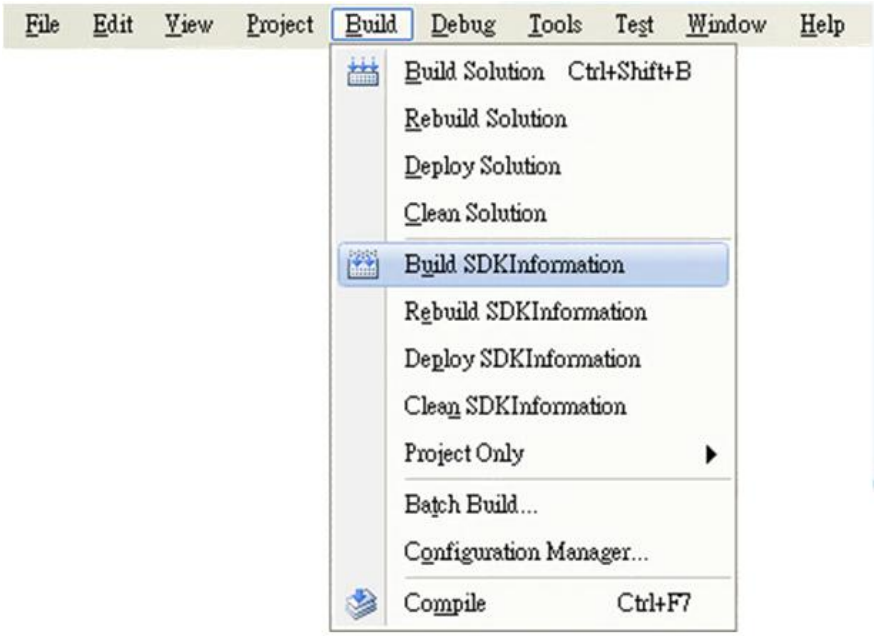
4.4.5. Upload the Application to WinPAC

WinPAC supports FTP server service. You can upload files to WinPAC or download files from a public FTP server.



Step 1: On the Build menu, click Build SDKInformation



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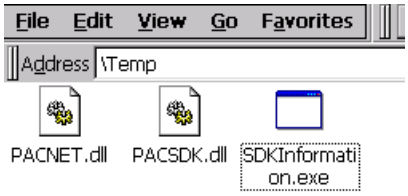
Step 2: Open the browser and type the IP address of WinPAC

Step 3: Upload the SDKInformation.exe application and the corresponding PACSDK.dll and PACNET.dll files to WinPAC

Tips & Warnings

For applications programming in C# and VB.net with .net compact framework, when executing these application on WinPAC, the corresponding PACSDK.dll and PACNET.dll must be in the same directory as the .exe file.



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4.4.6. Execute the Application on WinPAC

After uploading the application to WinPAC, you can just double-click it on WinPAC to execute it.

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4.5. First WinPAC Program in Visual C++

The best way to learn programming with WinPAC is to actually create a WinPAC program.

The example below demonstrates how to create a demo program running on WinPAC with Visual C++

To create a demo program with Visual C++ that includes the following main steps:

1. Create a new project
2. Configure the platform
3. Specify the path of the PAC reference
4. Add the control to the form
5. Add the event handling for the control
6. Upload the application to WinPAC
7. Execute the application on WinPAC

All main steps will be described in the following subsection.

Tips & Warnings

Before beginning a new project, the “Embedded Compact 7 ATL Update” must be installed. If this update is not installed, the error message “atlconv.h error C2039: lstrlenW" will be displayed after the program is compiled.

The update can be found on the CD that was provided with the package or by downloading the latest version from Microsoft.

CD:\SDK\VisualStudioDeviceWindowsEmbeddedCompact7.msi

http://download.microsoft.com/download/9/D/D/9DDBD3EC-A43C-4BCE-A7A9-AEE9B1007BCE/VisualStudioDeviceWindowsEmbeddedCompact7.msi

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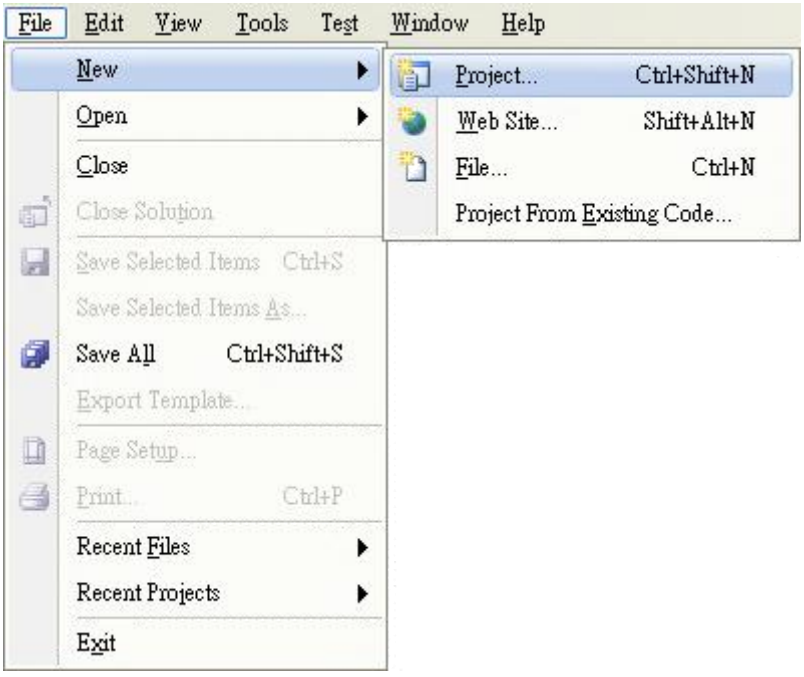
4.5.1. Create a New Project

The Visual C++ project template is a composite control that you use in this example creates a new project with this user control.

Step 1: Run the Visual Studio 2008

Visual Studio 2008

Step 2: On the File menu, point to New, and then click Project



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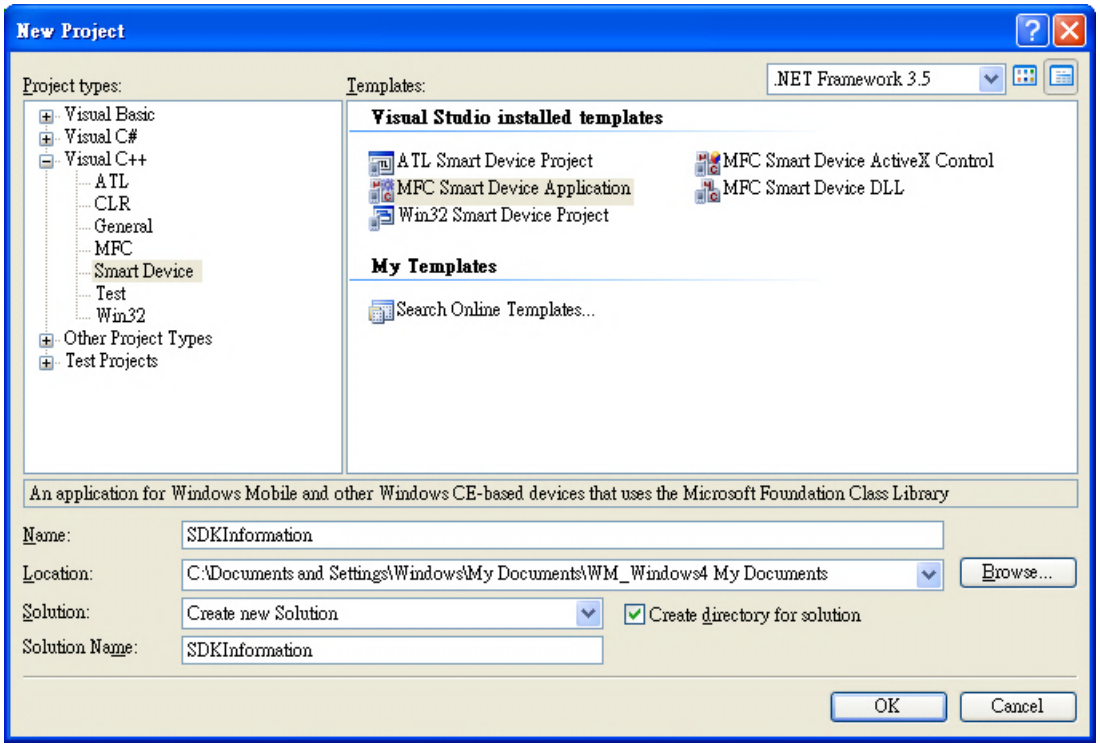
Step 3: In the Project types pane, expand Visual C++, and then click Smart Device

Step 4: In the Templates pane, click MFC Smart Device Application

Step 5: Type a name in the Name field, and then click OK

Here we will enter the name “SDKInformation” and a different location for the project if you wish



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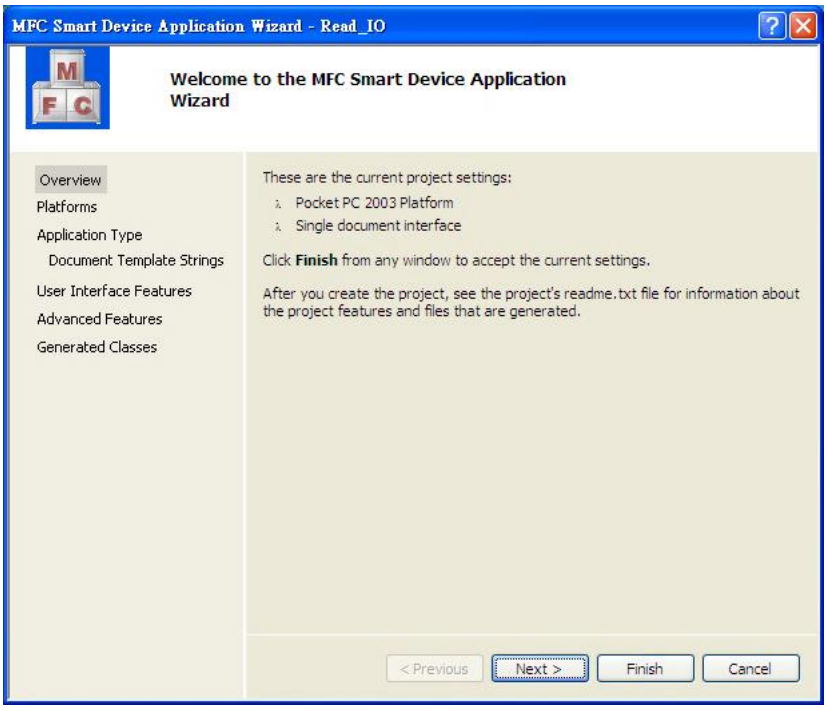
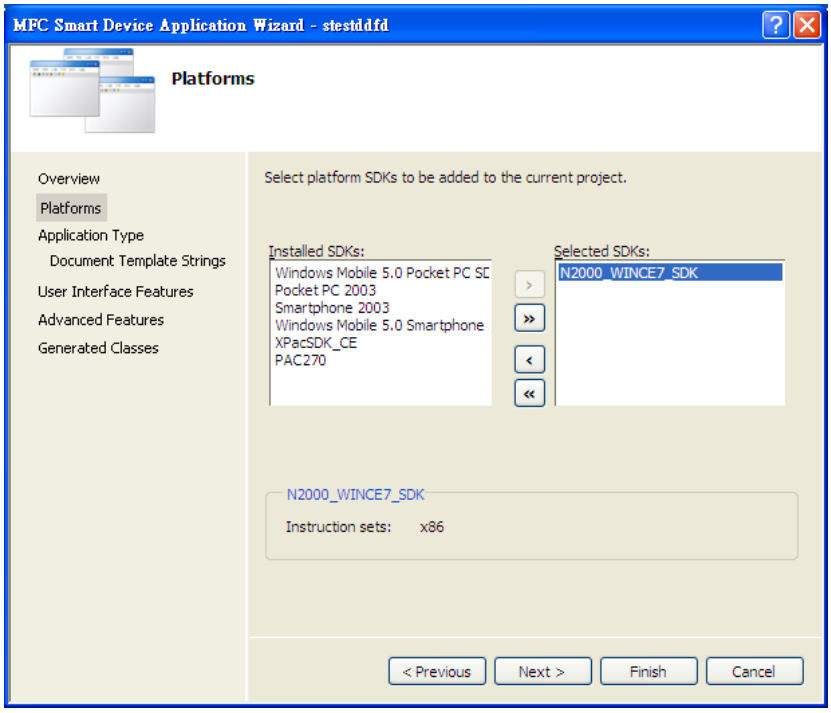
Step 6: On the first page of the wizard, click Next



Step 7: On the next page of the wizard, select N2000_WINCE7_SDK to be added to the project, and then click Next



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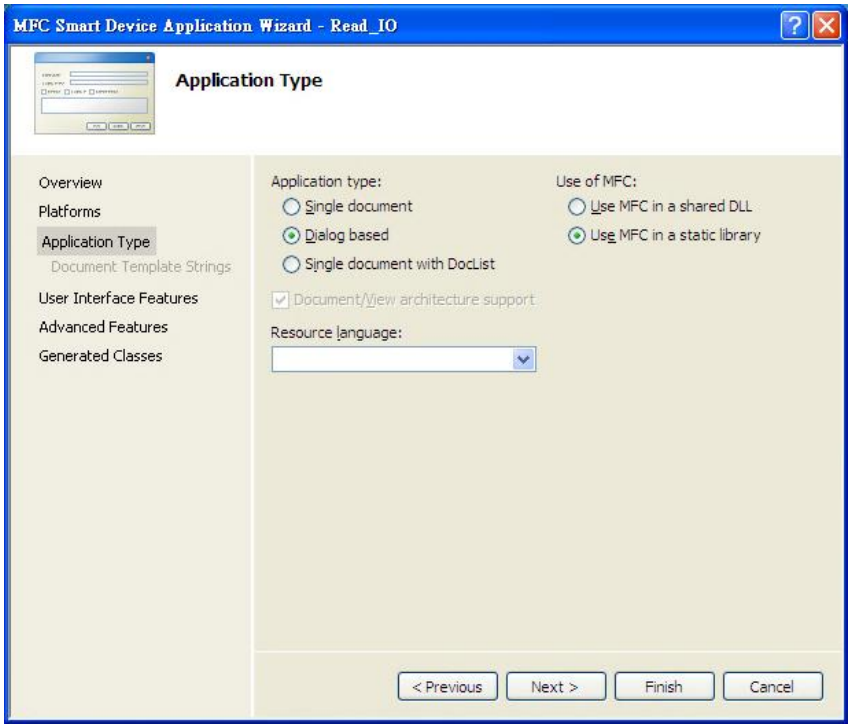
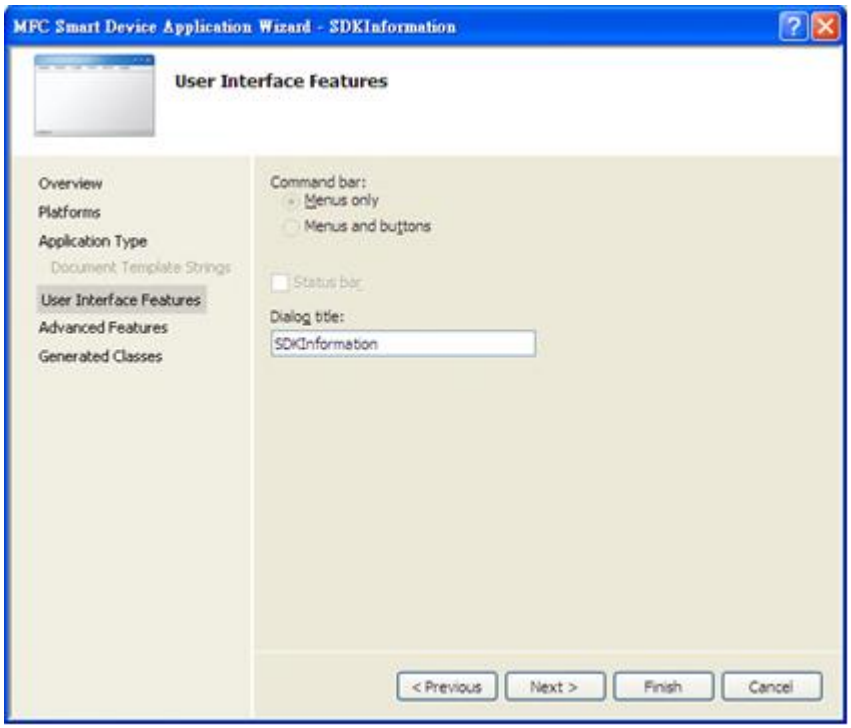
Step 8: On the next page of the wizard, select Dialog based, and then click next



Step 9: On the next page of the wizard, click next



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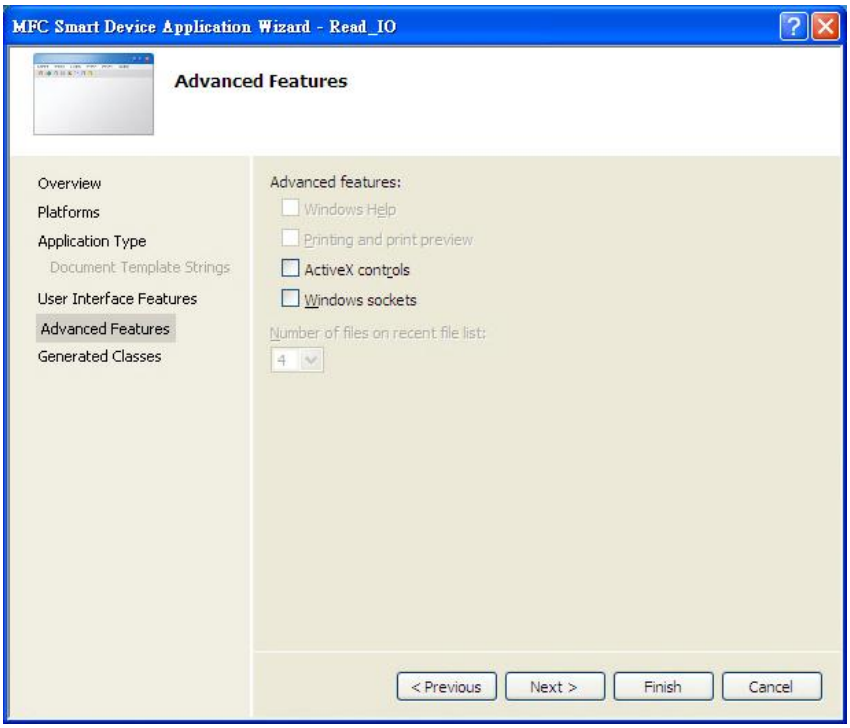
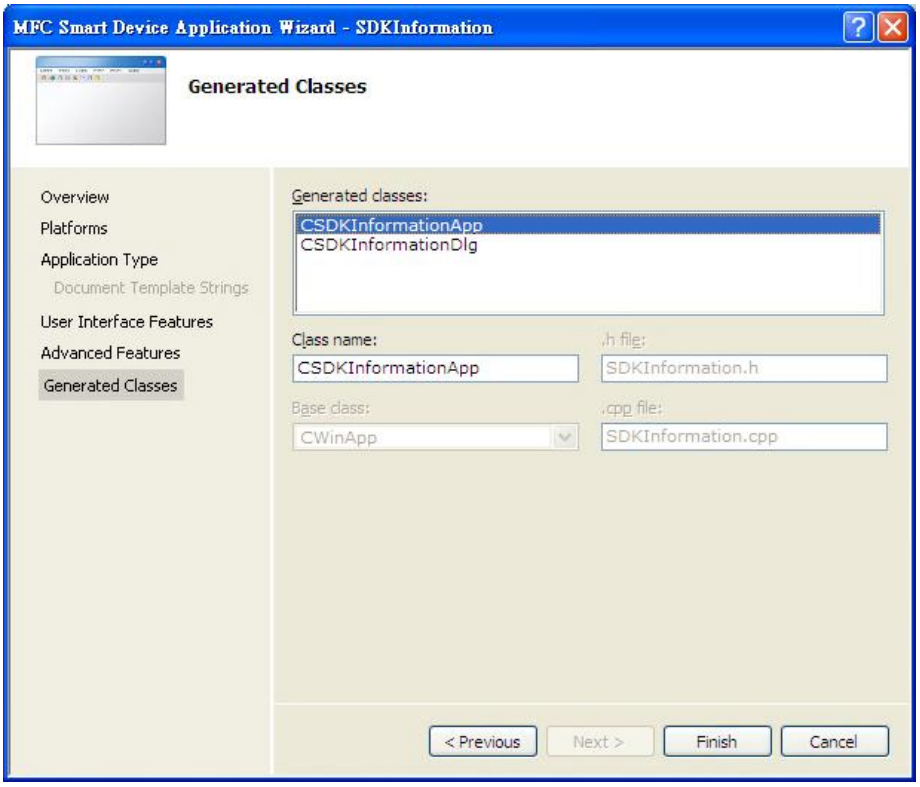
Step 10: On the next page of the wizard, click next



Step 11: On the next page of the wizard, click Finish



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4.5.2. Configure the Platform

When developing applications by using Visual C++, you must configure the Platform to indicate what platform and device you intend to download the application to. Before you deploy your project, check the platform.

On the Debug configuration toolbar, select Release, and then on the Pocket PC 2003 (ARMV4) configuration toolbar, select N2000_WINCE7(x86), as shown in the following illustration.

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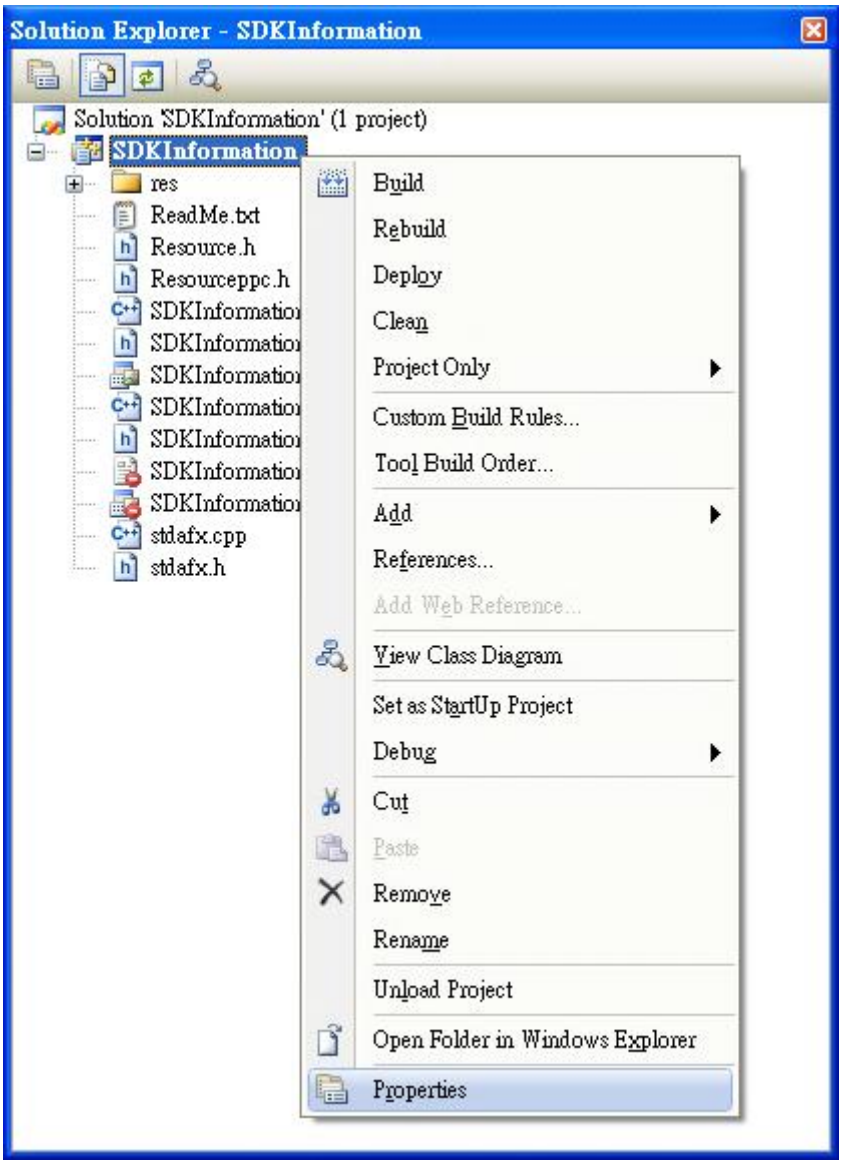
4.5.3. Specify the Path of the PAC Reference

The PAC SDK provides a complete solution to integrate with WinPAC and it's compatible with Visual C#, Visual Basic .net and C++. In order to use a component in your application, you must first add a reference to it.

Step 1: Right-click the project name, and then click Properties



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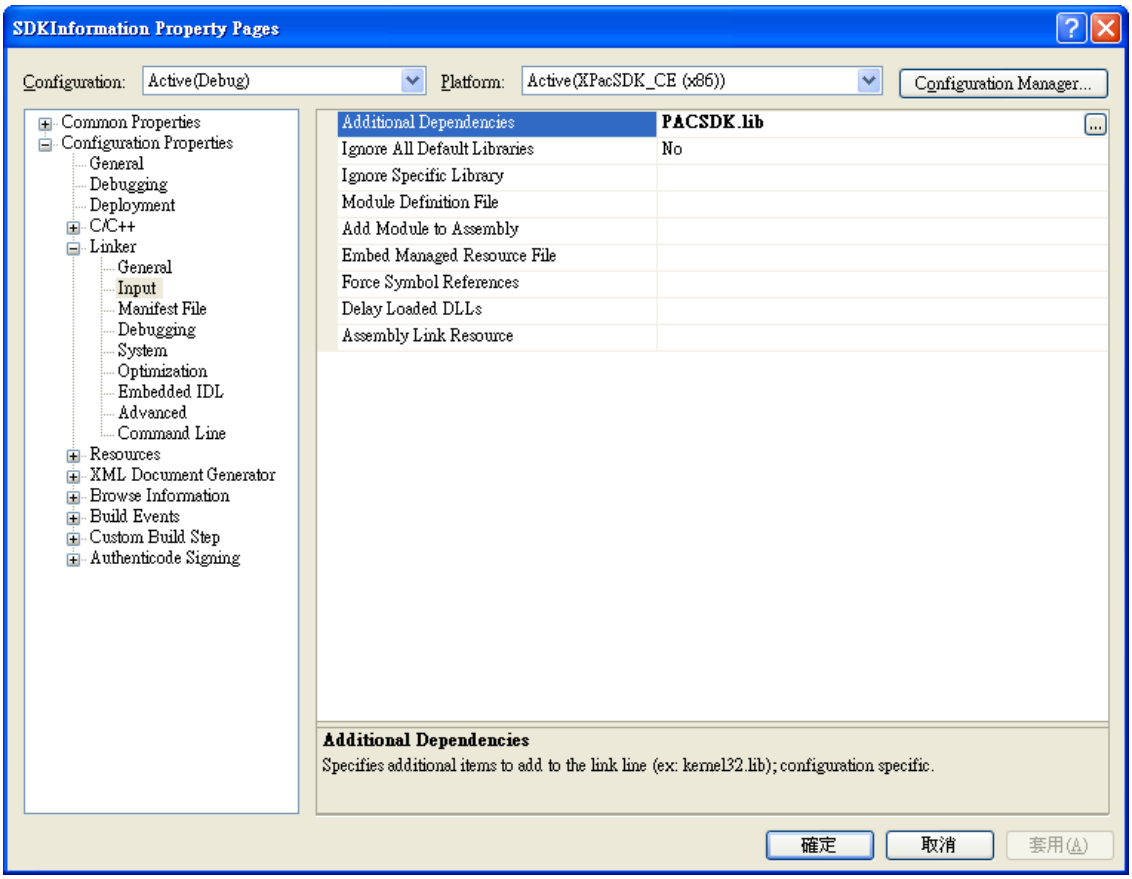
Step 2: In left pane, expand Configuration Properties, and then click Link

Step 3: In the right pane, choose the PACSDK_CE.lib in the Additional Dependencies item



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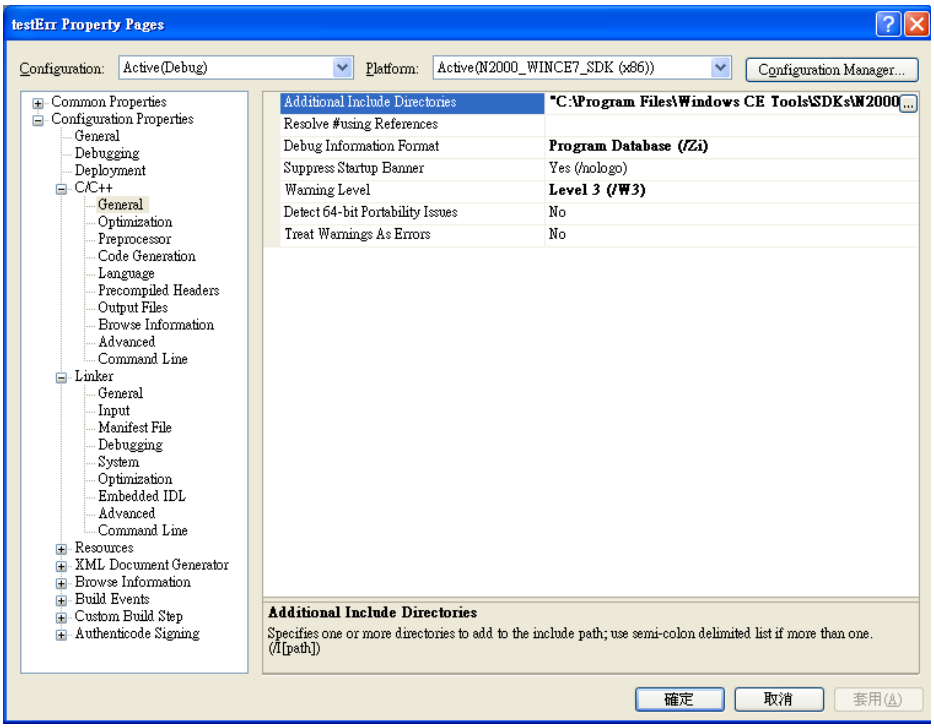
Step 4: In the right pane, choose the following path in the “Additional Include Directories” item

C:\Program Files\Windows CE Tools\SDKs\N2000_WINCE7_SDK\Include\X86
C:\Program Files\Microsoft Visual Studio 9.0\VC\ce7\atlmfc\include



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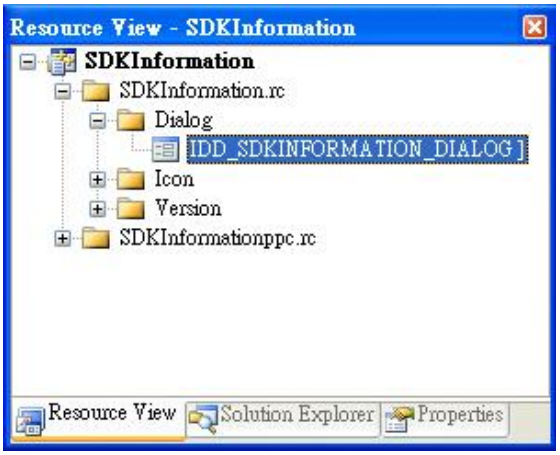
4.5.4. Add the Control to the Form

You can drag various controls from the Toolbox onto the form. These controls are not really "live"; they are just images that are convenient to move around on the form into a precise location.

After you add a control to your form, you can use the Properties window to set its properties, such as background color and default text. The values that you specify in the Properties window are the initial values that will be assigned to that property when the control is created at run time.

Step 1: In Resource View, expand the resources tree by opening the top level folder

Step 2: Open the Dialog folder and then double-click the dialog resource name IDD_SDKINFORMATION_DIALOG



The resource editor appears in the right pane.

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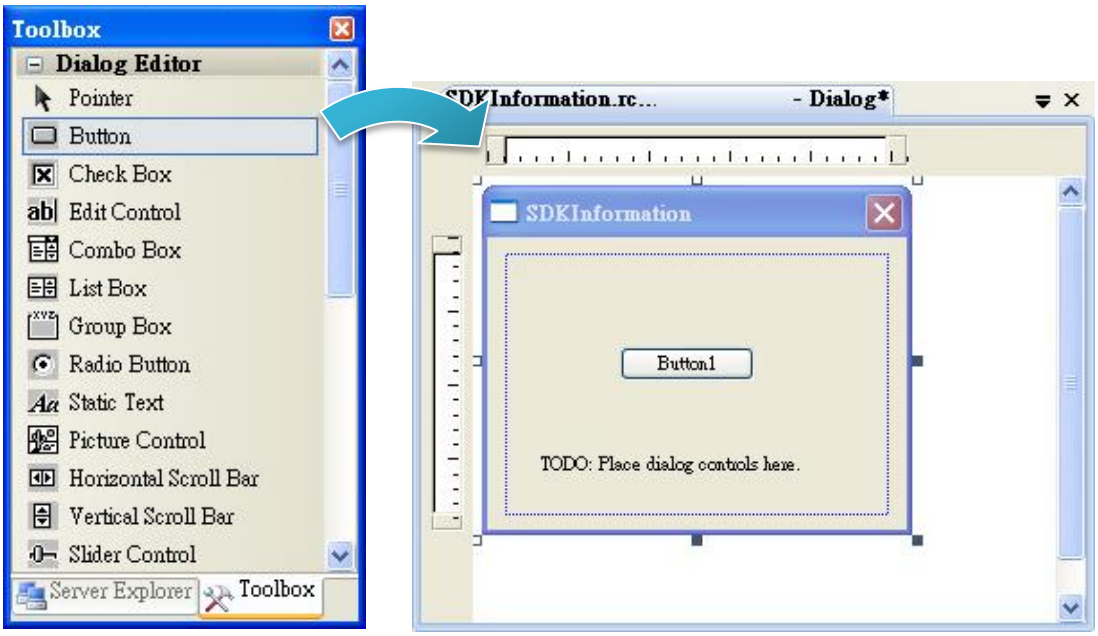
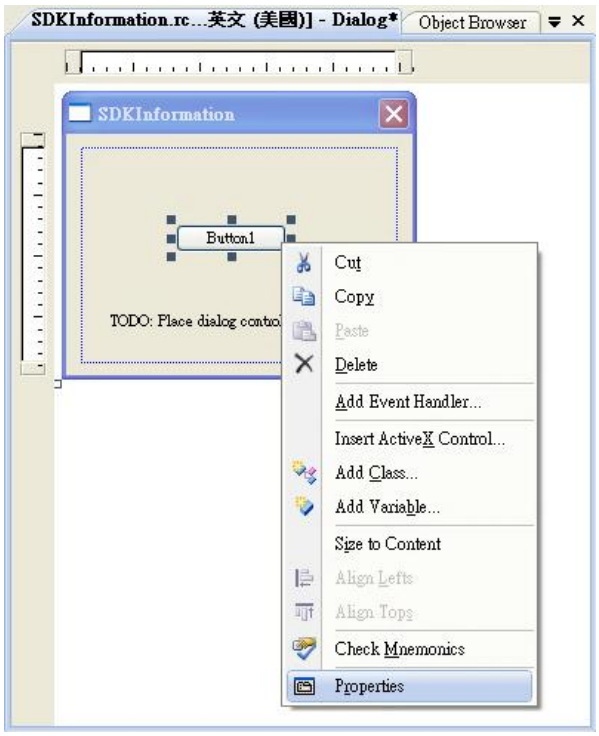
Step 3: From the Toolbox, drag a Button control onto the form



Step 4: Right-click the Button control, and then click Properties



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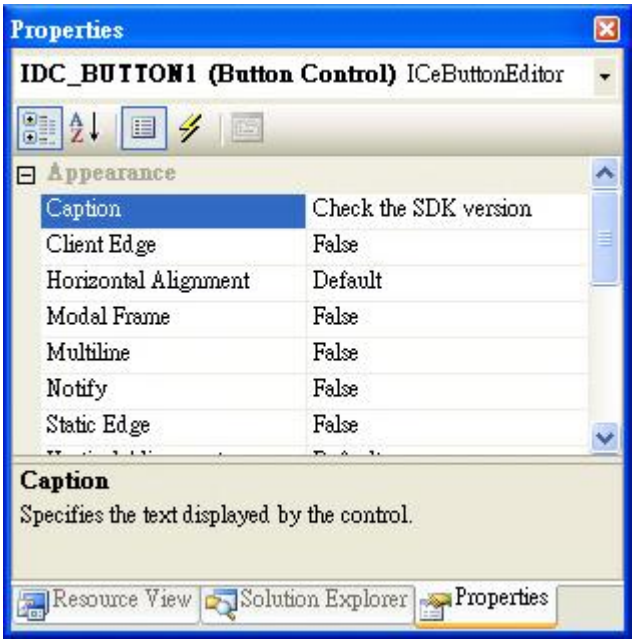
Step 5: In the Properties window, type Check the SDK version, and press ENTER to set the Text property



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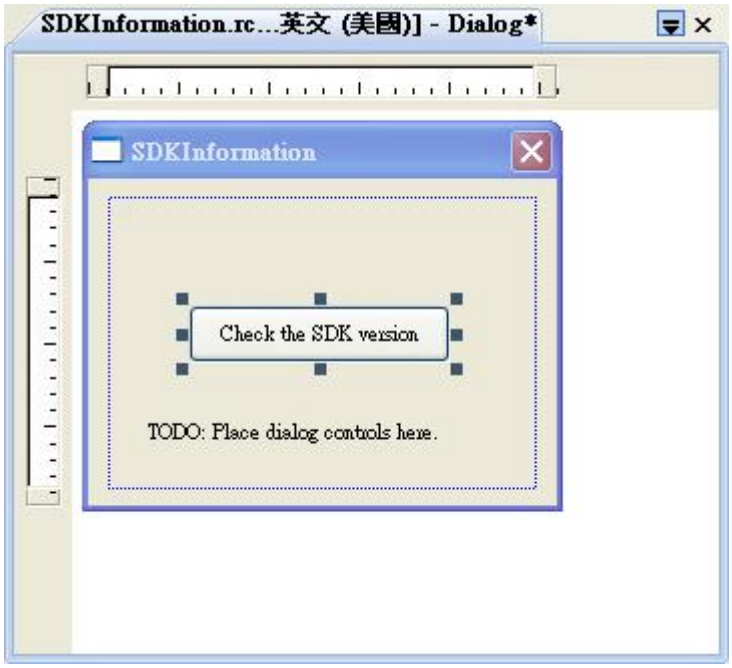
4.5.5. Add the Event Handling for the Control

You have finished the design stage of your application and are at the point when you can start adding some code to provide the program's functionality.

Step 1: Double-click the button on the form



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Step 2: Inserting the following code

```
char sdk_version[32];
TCHAR buf[32];
pac_GetSDKVersion(sdk_version);
pac_AnsiToWideString(sdk_version, buf);
MessageBox(buf,0,MB_OK);
```

```
void CSDKInformationDlg::OnBnClickedButton1()
{
    // TODO: Add your control notification handler code here
    char sdk_version[32];
    TCHAR buf[32];
    pac_GetSDKVersion(sdk_version);
    pac_AnsiToWideString(sdk_version, buf);
    MessageBox(buf,0,MB_OK);
}
```

Step 3: Inserting the following code into the header area

```
#include “PACSDK.h”
```

```
#include "stdafx.h"
#include "SDKInformation.h"
#include "SDKInformationDlg.h"
#include "PACSDK.H"
```


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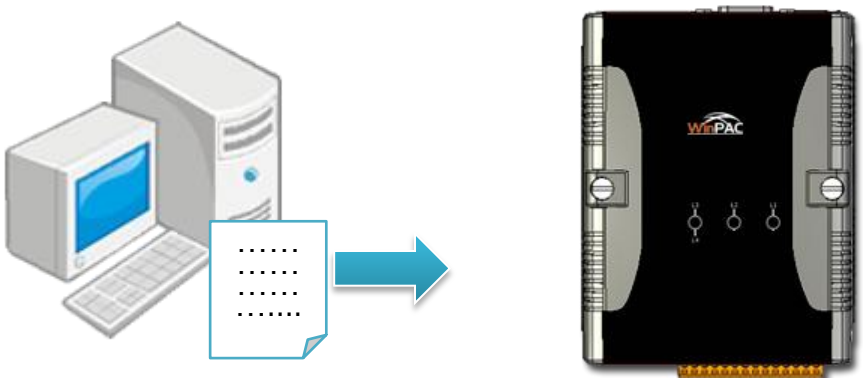
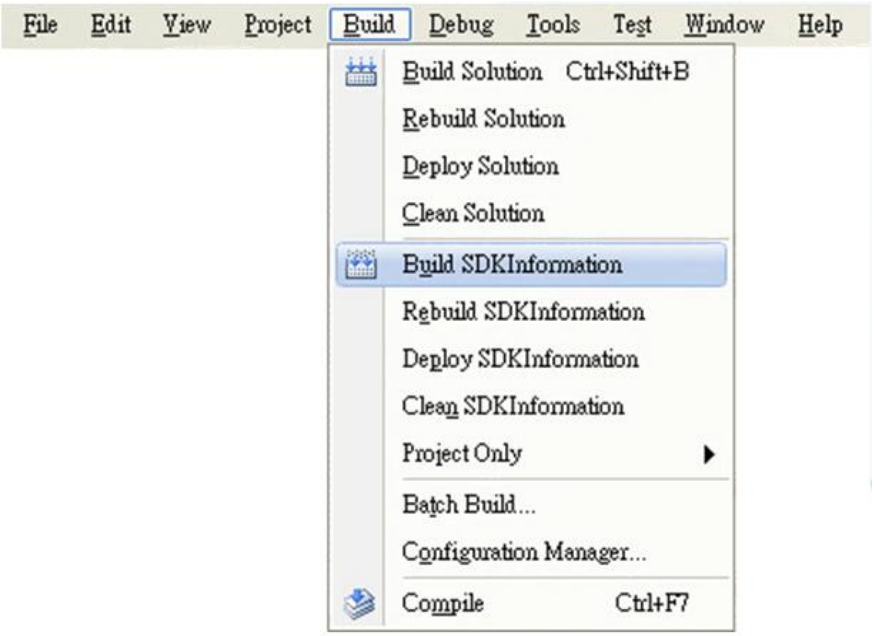
4.5.5.1. Upload the Application to WinPAC

WinPAC supports FTP server service. You can upload files to WinPAC or download files from a public FTP server.



Step 1: On the Build menu, click Build SDKInformation



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Step 2: Open the browser and type the IP address of WinPAC

Step 3: Upload the SDKInformation.exe application to WinPAC

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4.5.5.2. Execute the Application on WinPAC

After uploading the application to WinPAC, you can just double-click it on WinPAC to execute it.

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A. Tips – How to

This chapter provides tips and a guided tour on using and maintaining the WinPAC.

A.1. How to use the Printer

WinPAC have ability to access the printer, you can connect to the printer via Ethernet network or USB.

Tips & Warnings

WinPAC only supports HP Laser Jet Printers which support PCL6 driver. The following printer support is released by HP

- HP LaserJet 4000 series/HP LaserJet 4100 series
- HP LaserJet 2100 series/HP LaserJet 2200 series
- HP LaserJet 1200
- HP LaserJet 3200/HP LaserJet 3300
- HP LaserJet 4200 series/HP LaserJet 4300 series
- HP LaserJet 5000 series/HP LaserJet 5100 series
- HP LaserJet 8000 series
- HP LaserJet 9000 series printers

If you need the latest support of HP PCL6 printer, you can refer to following link
http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?objectID=bpl04568

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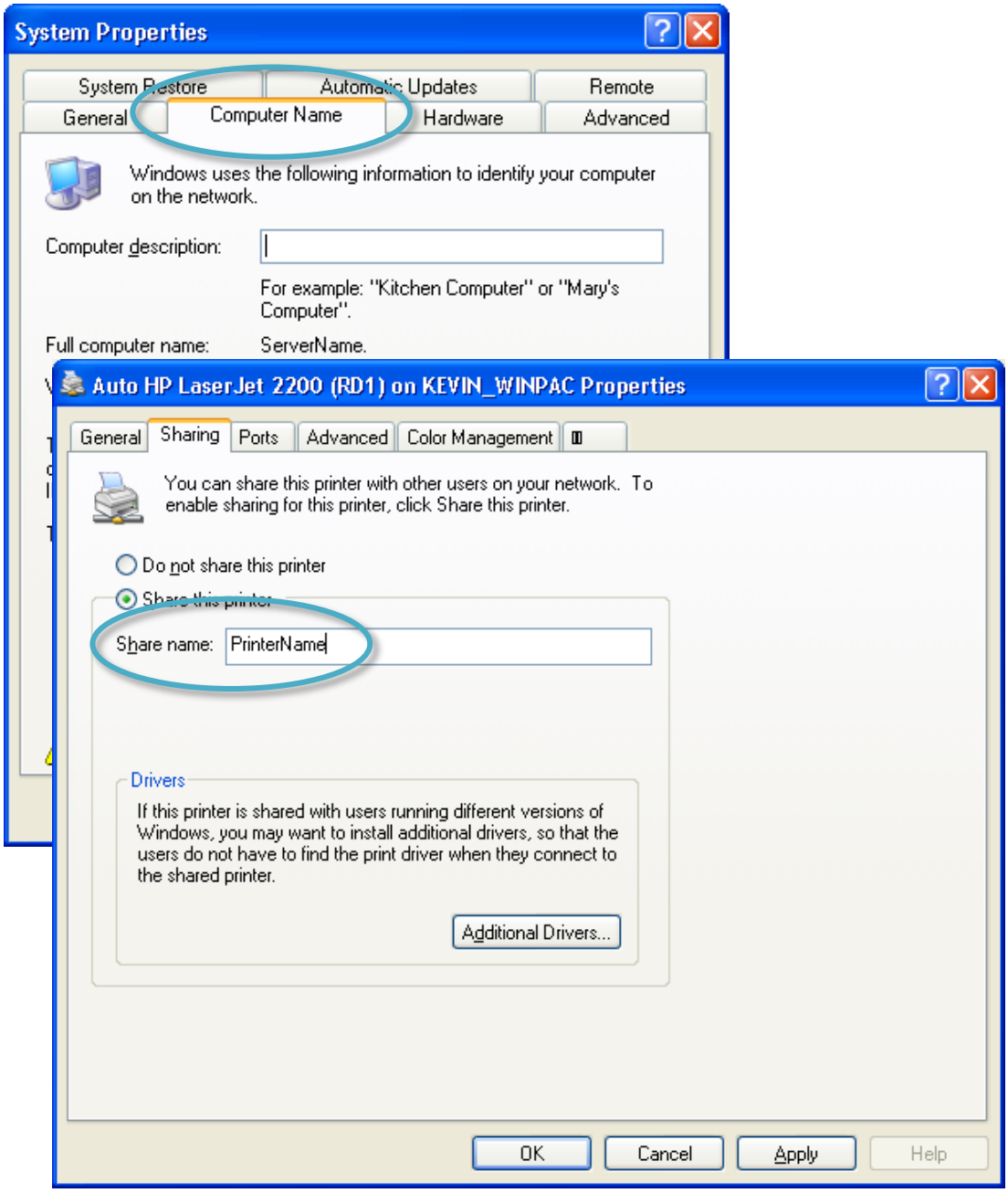
A.1.1. How to use the network printer

Here are step by step instructions on how to use a shared printer.

Step 1: On PC side, check the name of the PC and the shared printer



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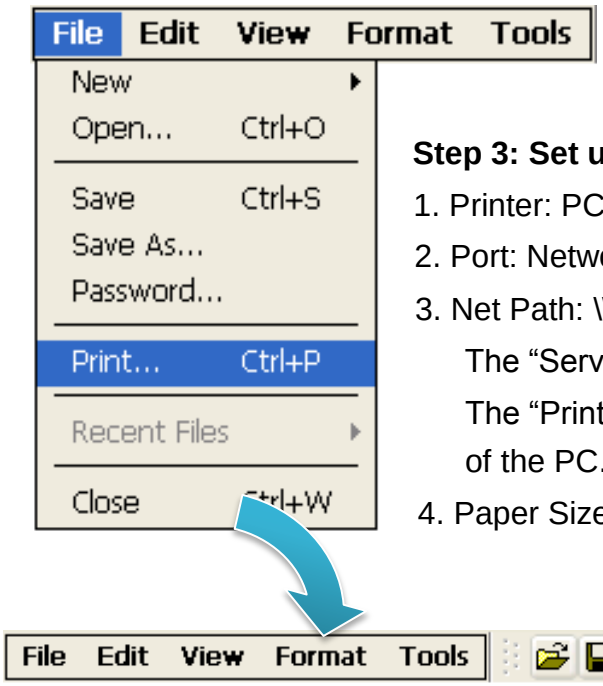
Step 2: On WinPAC – Run the Notepad, and then open a WordPad format file



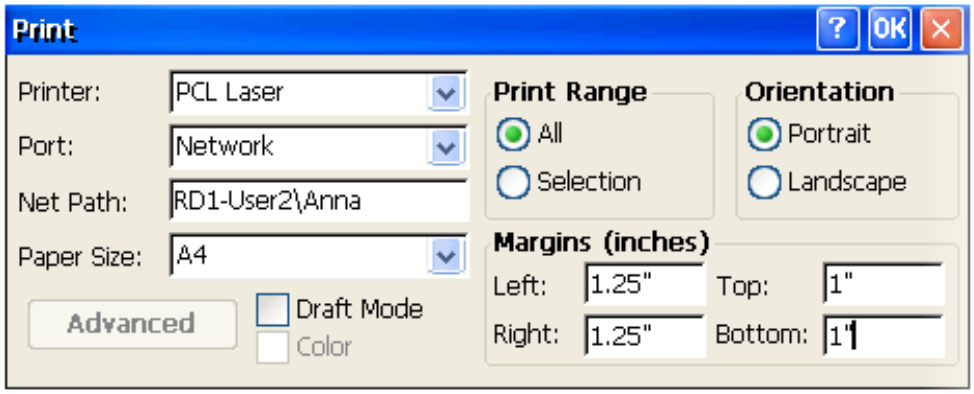
Step 3: Set up the printer

1. Printer: PCL Laser
2. Port: Network
3. Net Path: \\ServerName\PrinterName

   The “ServerName” is the name or IP of the PC.

   The “PrinterName” is the name of share printer of the PC.
4. Paper Size: Select the paper size

Test !!!



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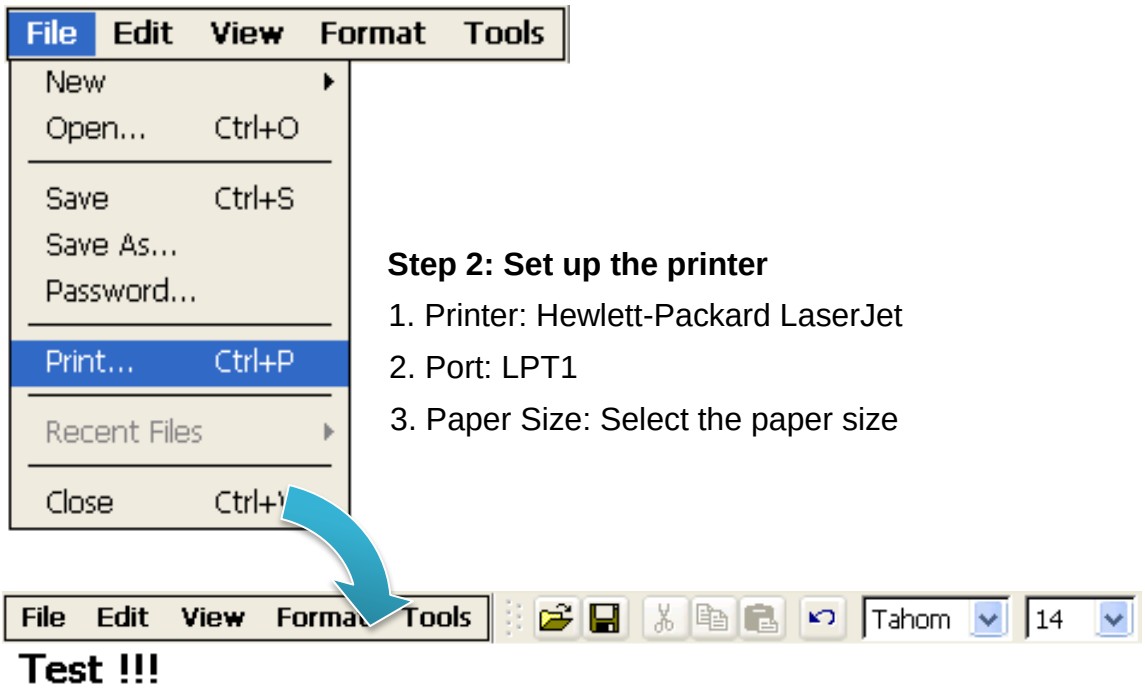
A.1.2. How to use the USB printer

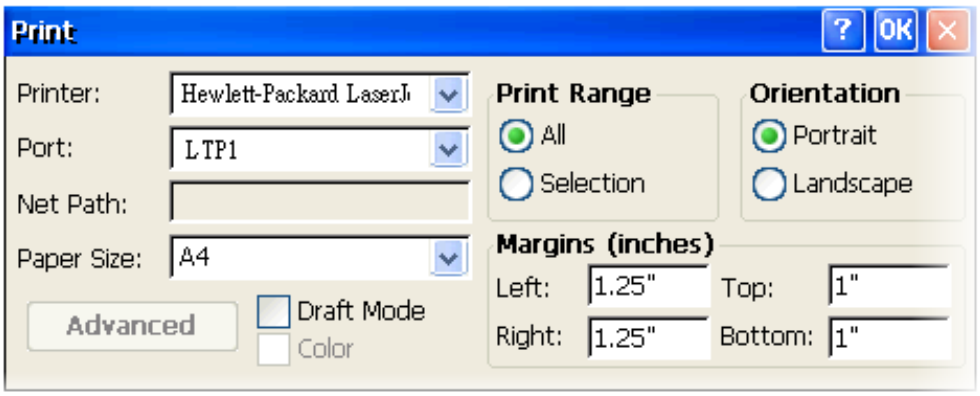
Here are step by step instructions on how to use a shared printer.

Step 1: Run the Notepad, and then open a WordPad format file



Step 2: Set up the printer

1. Printer: Hewlett-Packard LaserJet
2. Port: LPT1
3. Paper Size: Select the paper size



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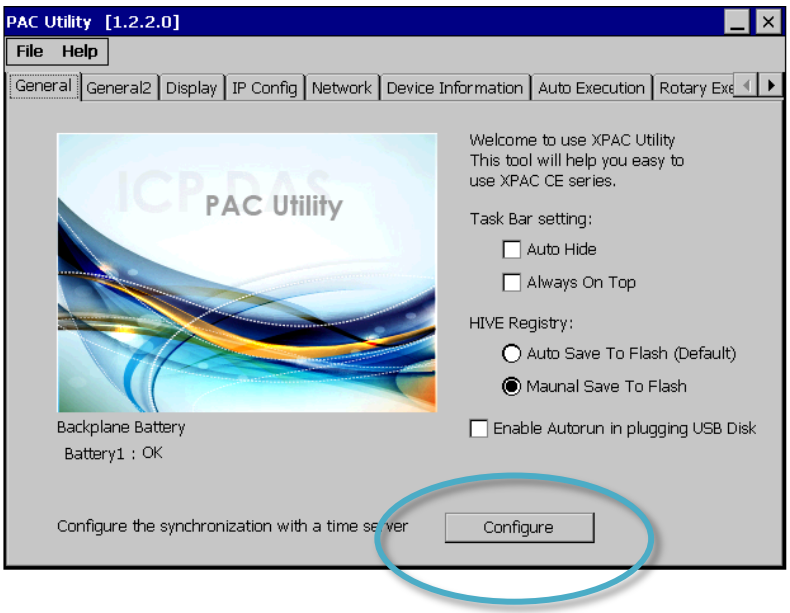
A.2. How to Automatically Synchronize WinPAC Clock with an Internet Time Server

You can synchronize your WinPAC clock with an Internet time server.

If synchronization is enabled, the WinPAC clock is synchronized with an Internet time server.

Step 1: Double-click the PAC Utility on the desktop

Step 2: On the General tab, press Configure button



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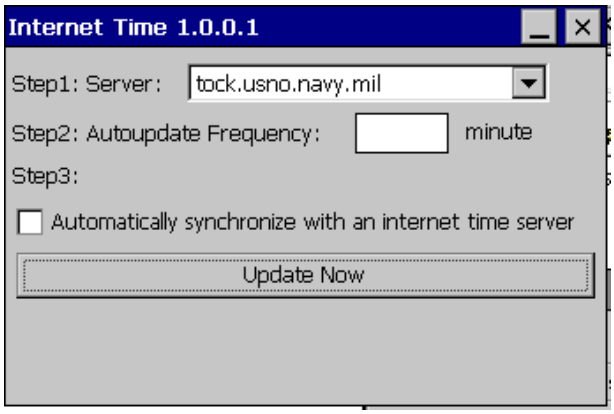
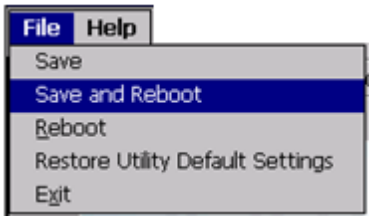
Step 3: Select the domain name from the Server drop-down list, and then enter a value in the Autoupdate Frequency field

Step 4: Check the Automatically synchronize with an internet time server check box

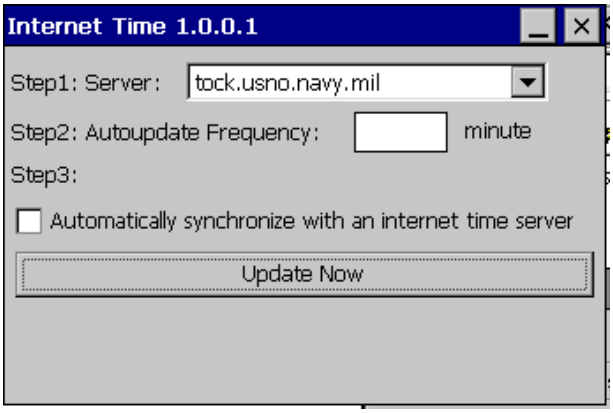


Step 5: On the File menu, click Save and Reboot



Step 6: The WinPAC will automatically synchronize with an internet time server regularly

Step 7: Click the Update Now button to synchronize WinPAC clock immediately



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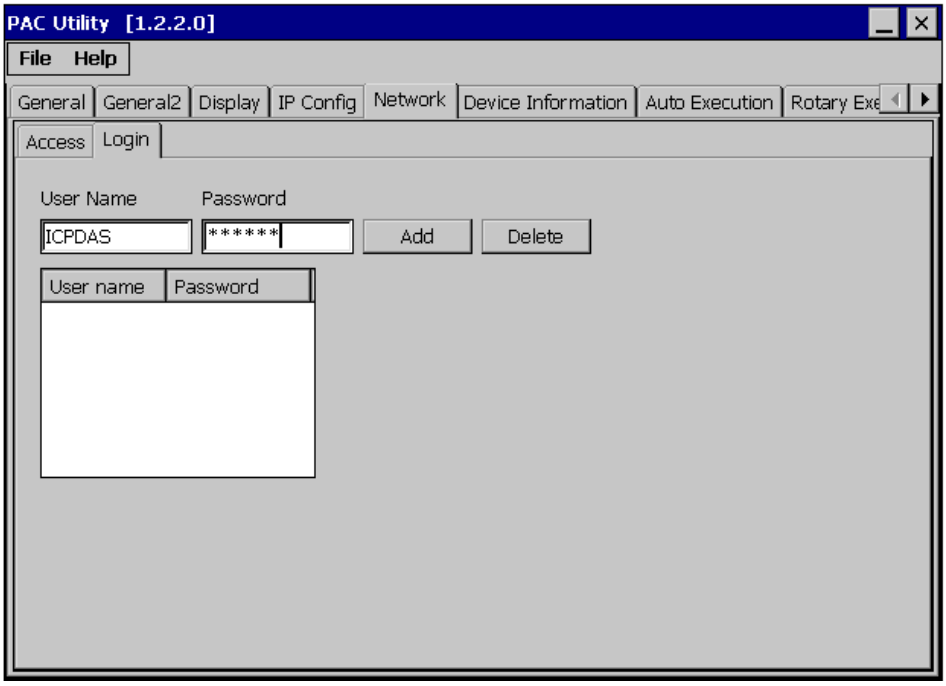
A.3. How to use User Account Control in WinPAC

A.3.1. How to Create an User Account

Here are step by step instructions on how to add a user account.

Step 1: Double-click the PAC Utility on the desktop

Step 2: On the Login tab of the Network tab, click Login tab, type the User Name and Password, and then click Add button



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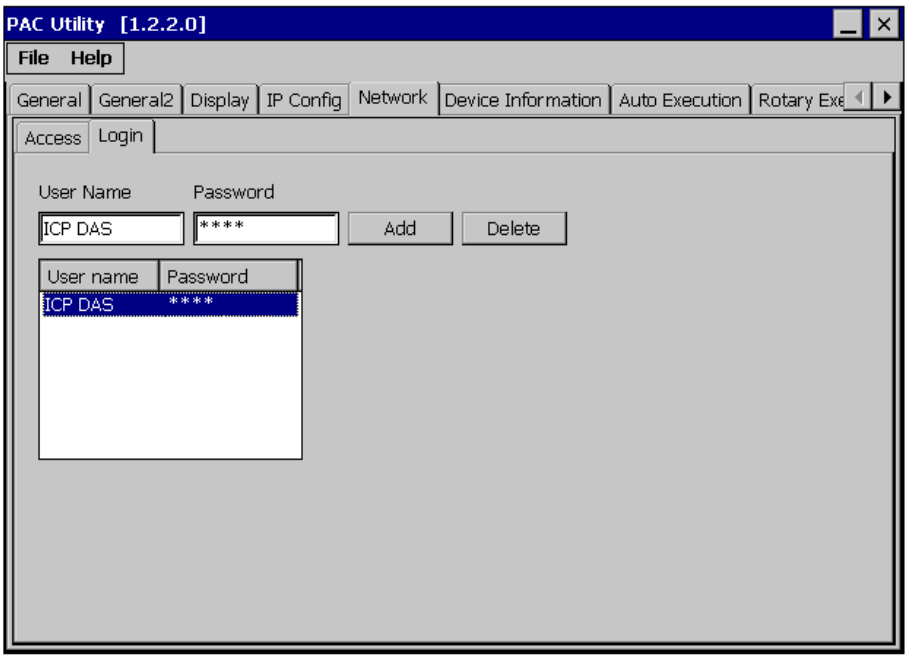
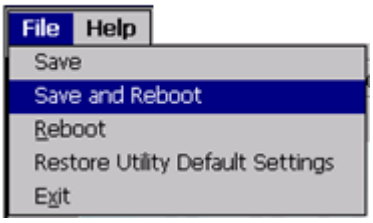
Step 3: The user has been added to the allowed under the remote login and included in the following list



Step 4: On the File menu, click Save and Reboot for changes to take effect



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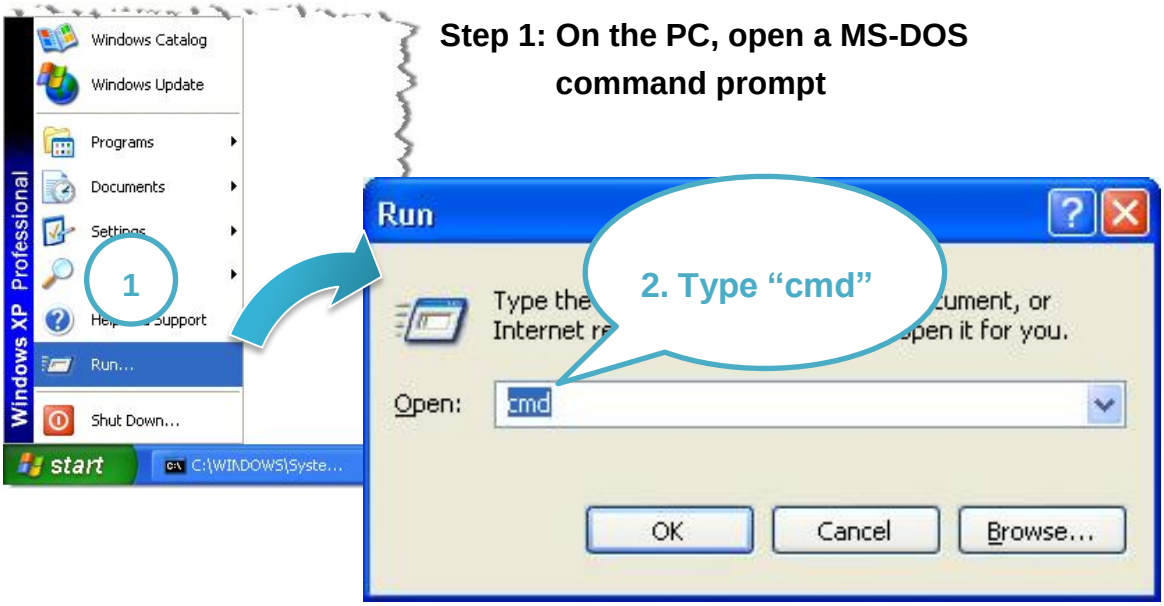
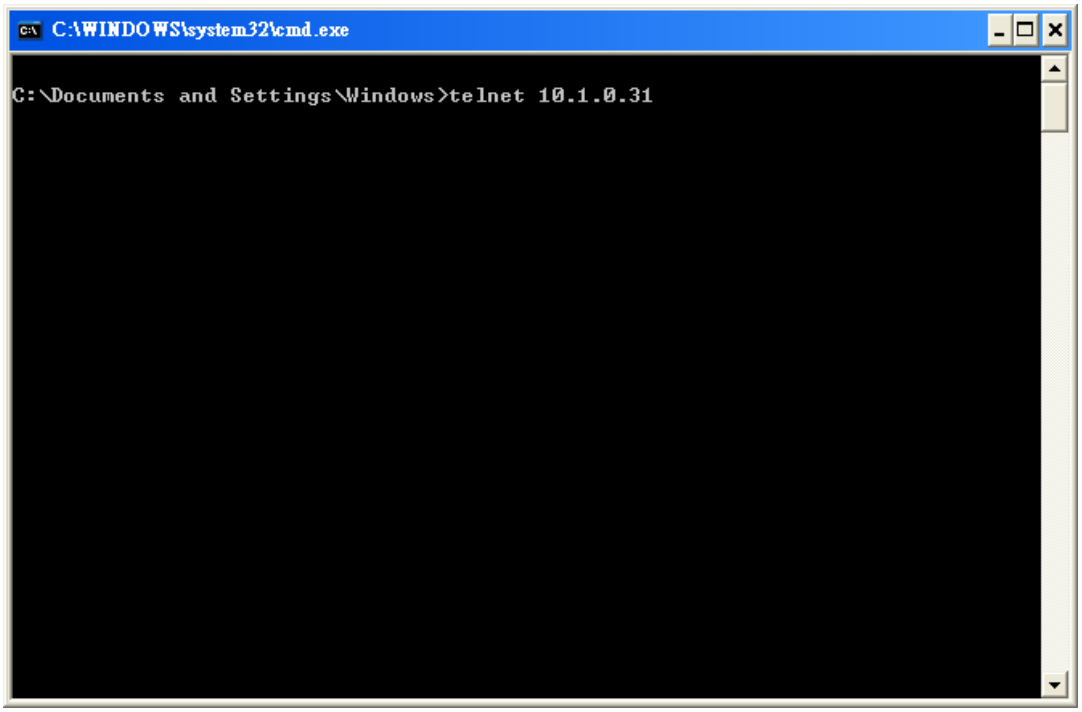
A.3.2. How to Use Telnet to remote login the WinPAC from PC

Here are step by step instructions on how to use telnet to remote login the WinPAC from PC.



Step 1: On the PC, open a MS-DOS command prompt

Step 2: At the command prompt, type “telnet (IP address)”



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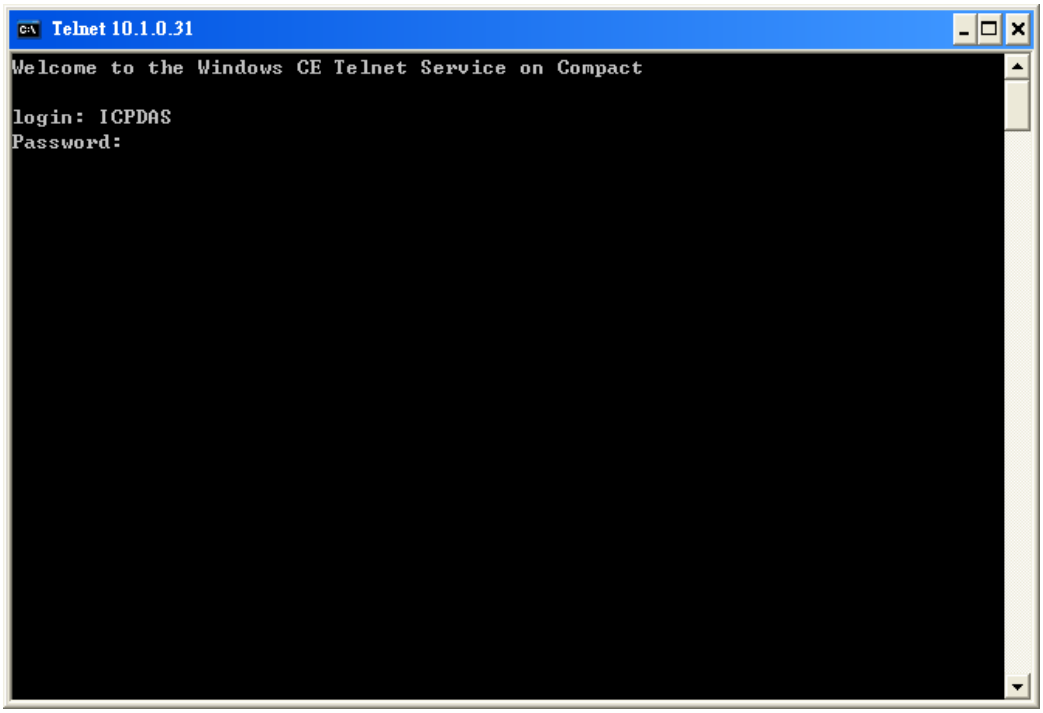
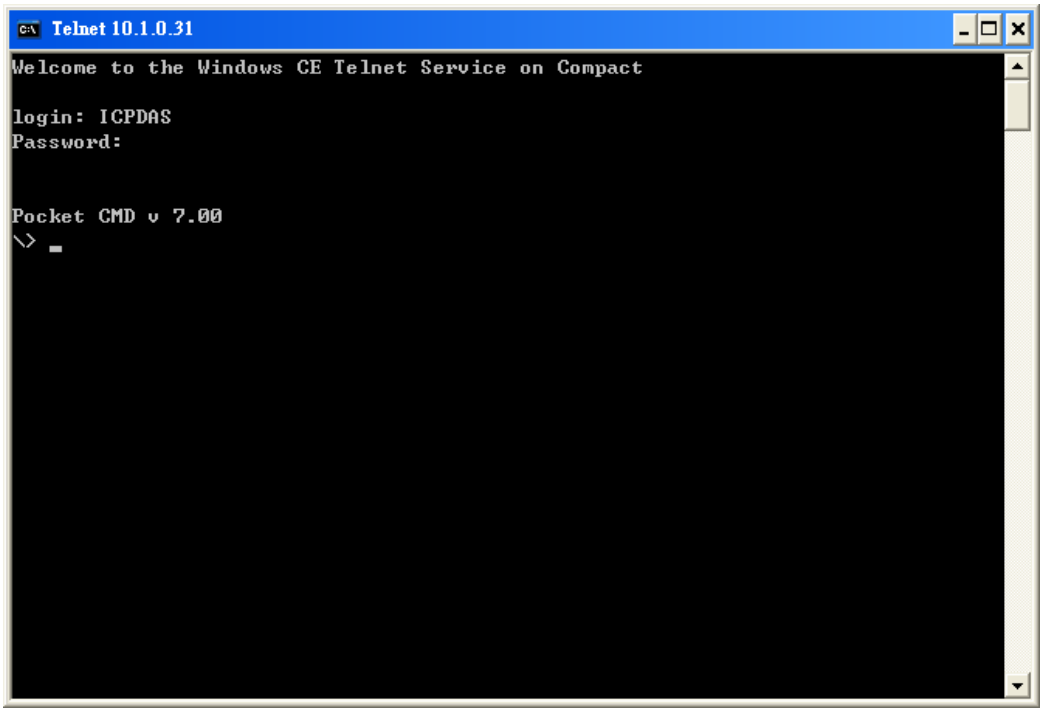
Step 3: The connection has been set up, and then type the name and password



Step 4: The remote login has been completed



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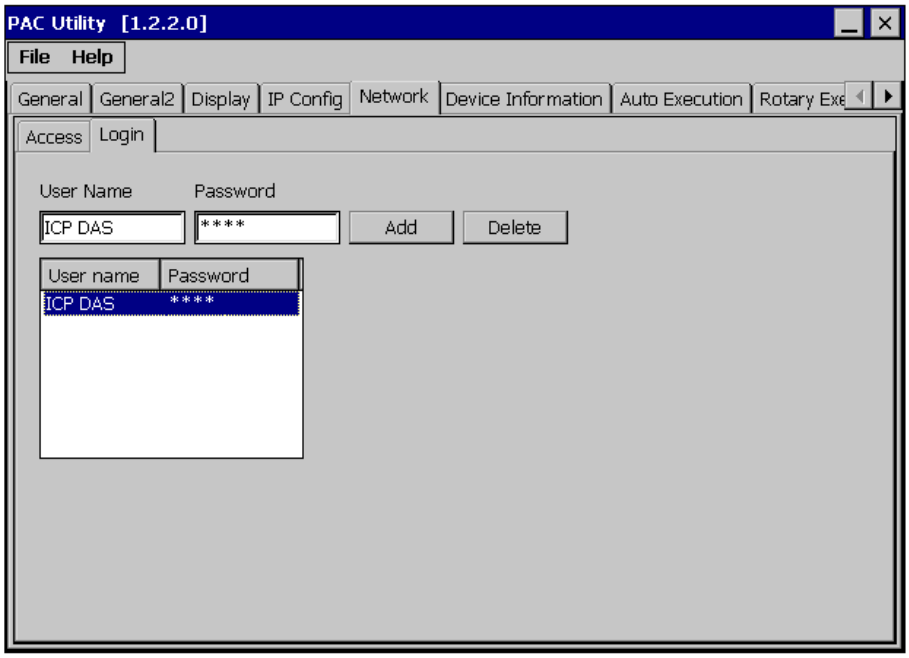
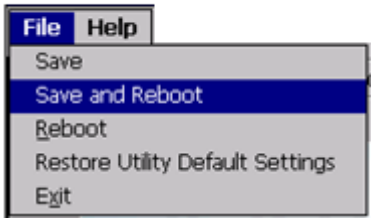
A.3.3. How to Remove a User Account from the Login List

Here are step by step instructions on how to remote the user from the login list.

Step 1: Click a user from the list which you want to remove, and the user will display in the field, and then press Delete to delete the user from the login list



Step 2: On the File menu, click Save and Reboot for changes to take effect



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B. XV-Board Modules

The XV-board series are for LP-5000, WP-5231. One PAC can only plug only one XV-board. The XV-board series have following common specification:

- DI channel is dry contact, sink type.
- DO channel is open collector, sink type.

DIO Expansion

Model	DI			DO	
	Channel	Type	Sink/Source	Channel	Sink/Source
XV107	8	Wet	Source	8	Sink
XV107A			Sink		Source
XV110	16	Dry/Wet	Sink/Source	-	-
XV111	-			16	Sink
XV111A					Source

Relay Output Expansion

Model	DI			Relay Output	
	Channel	Type	Sink/Source	Channel	Type
XV116	5	Wet	Sink/Source	2	Signal Relay
				4	Power Relay

Multi-Function Expansion

Model	AI	AO	DI			DO	
	Channel			Type	Sink/Source	Channel	Sink/Source
XV308	8	-	DI+DO=8	Dry/Wet	Source	DI+DO=8	Sink
XV310	4	5	4		Sink		Source

For more detailed information about these support modules, please refer to http://www.icpdas.com/root/product/solutions/hmi_touch_monitor/touchpad/xv-board_selection.html

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C. Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Description
	July 2014	Initial issue

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